

The Journal

OF THE

BOARD OF AGRICULTURE

OCTOBER, 1911.

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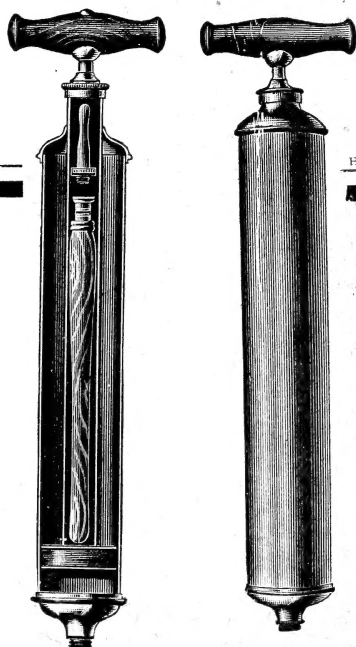
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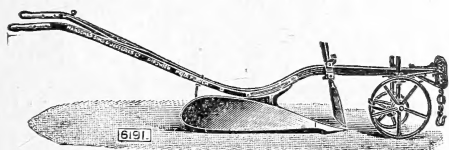
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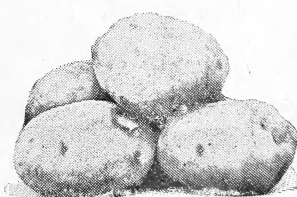
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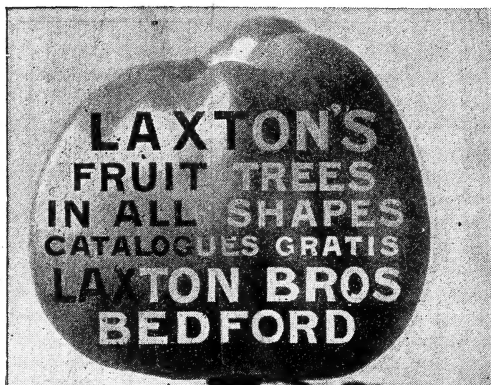
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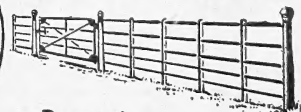
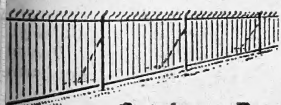
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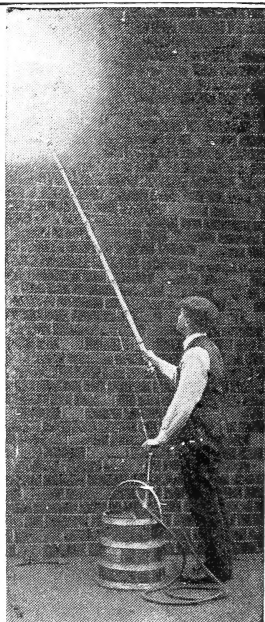
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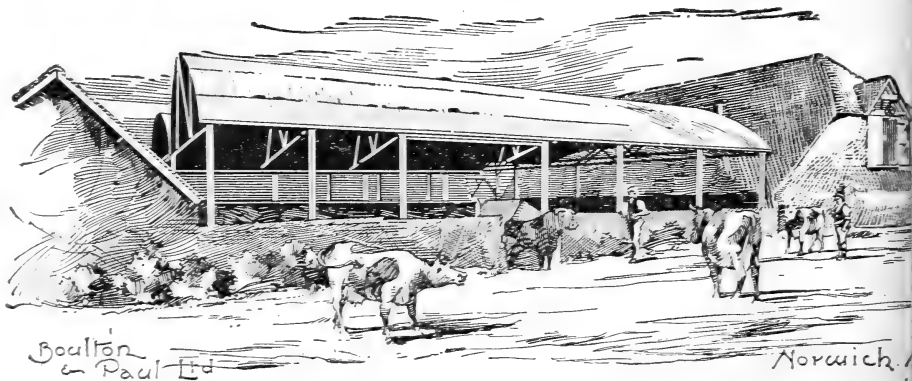
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THE JOURNAL

OF THE

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Vol. XVIII. No. 7.

OCTOBER, 1911.

THE PROMOTION OF AGRICULTURAL RESEARCH.

The Treasury, on the recommendation of the Development Commissioners, have sanctioned the Grant to the Board from the Development Fund of a sum not exceeding £33,000 per annum for the promotion of Agricultural Research.

The scheme approved by the Commissioners provides for Research in eleven groups of subjects, which cover more or less completely the whole field of agriculture. The work on each group will be concentrated at one, or in a few cases at two, Agricultural Research Institutions. Special investigations for which provision cannot be made at one of these Institutions will form the subject of separate grants.

AGRICULTURAL RESEARCH INSTITUTIONS.

In making arrangements for the separate investigation, as far as possible, of each group of subjects, the Commissioners and the Board have been impressed with the importance of securing continuity in work which is necessarily of considerable duration, and of providing staffs of specialists and experts who will be permanently engaged on work of the same class. By this means concentration and economy of effort will be better secured than it would be if a number of Institutions were dealing at the same time with the same subjects.

It is neither desirable nor possible to prevent all overlapping or duplication of research work, but it is necessary to proceed on a plan by which unnecessary expenditure on such work out of public funds will be avoided. It is also desirable that each group of subjects should be undertaken by

the Institution best fitted to deal with it, and usually by the Institution which has specially devoted its attention to problems of an allied nature.

It is also important to avoid the giving of undue attention to one part of the field of agricultural research to the exclusion of other parts which are of equal scientific and economic importance.

It has been arranged that grants shall be made for research in the following groups of subjects :—

1. Plant Physiology.
2. Plant Pathology.
3. Plant Breeding.
4. Fruit Growing, including the practical treatment of plant diseases.
5. Plant Nutrition and Soil Problems.
6. Animal Nutrition.
7. Animal Breeding.
8. Animal Pathology.
9. Dairying.
10. Agricultural Zoology.
11. Economics of Agriculture.

A sum not exceeding in the aggregate £30,000 per annum has been set aside for the purpose. This sum is intended to provide aid for two Research Institutions for Plant Breeding, two for Animal Pathology, two for Agricultural Zoology, one Research Institution and two or three local experimental gardens for Fruit Growing, and one Research Institution for each of the other groups of subjects except Animal Breeding. In the case of Animal Breeding it has been resolved to postpone, for the present, the formation of an Institution, but grants in aid of this work at one or two centres will be available.

The maximum grants for research sanctioned by the Treasury will only become available when the institutions to be aided have arranged a full programme of work. Until the staff has been completed, and all preliminary requirements such as buildings and equipment have been satisfied, temporary grants in aid of expenditure will be paid. The first requirement in each case will be the preparation of a detailed scheme showing what provision would be necessary in order

that a group of subjects may be adequately treated. When these schemes have been submitted by the institutions concerned, provisional Research Grants will be allocated as the necessities of the case may require.

Character of the Research Work.

The Development and Road Improvement Funds Act, 1909, provides that the Development Fund is to be used, *inter alia*, for "aiding and developing agriculture and rural industries by promoting scientific research, instruction and experiments in the science, methods, and practice of agriculture." The expression "agriculture and rural industries" is defined as including "agriculture, horticulture, dairying, the breeding of horses, cattle, and other live stock and poultry, the cultivation of bees, home and cottage industries, the cultivation and preparation of flax, the cultivation and manufacture of tobacco, and any industries immediately connected with and subservient to any of the said matters."

It would be quite impracticable in the case of an art which, like agriculture, may be served by many branches of science, to attempt to frame a list of subjects that might properly engage the attention of investigators. And if such a list were practicable it would be undesirable that an attempt should now be made to compile it, for it is clear that in many branches of scientific work the only person qualified to form an opinion as to the practical bearing of a particular investigation may be the investigator himself. Such being the case, it is of the greatest importance that the staff of those Research Institutions to which grants are made from the Fund should keep steadily in view the requirements of the Act, and refuse to be satisfied with their work unless it results in some development of agriculture.

In view of the fact that there is much work to be done in applying known scientific principles to the service of agriculture, those responsible for guiding the work of the younger men who will be employed under the scheme should give the preference to work the results of which are likely to be definite. There is, for example, a wide field for the application of Mendelian principles in breeding new types of plants, and there are many insect and fungus pests which if studied by

men trained in scientific methods would cease to be the cause of much loss to the farmer and gardener.

Reports on Work.

It is not intended that periodical reports for publication shall be required from Research Institutions. Each scientific worker will, as a rule, be expected to contribute the results of his work, so soon as it may be sufficiently advanced, to a British scientific journal for publication. He will be expected to secure the acceptance of his work by the journals which circulate chiefly among scientific readers specially interested in the subject of his research, so that State-aided scientific work may have the advantage of the criticism of the scientific public.

In certain cases the work may be published by an Institution in the form of periodical scientific memoirs or in book form; but for the present this course would not usually be desirable, and the cost of such publications should not be charged to the Research Grants without the express sanction of the Board, which will only be given in exceptional circumstances:

As soon as any statement as to research work has been published, each writer will be required to supply to the Board a short article or note explaining the objects and results of his work in a form suitable for publication in the *Journal of the Board of Agriculture*, so that farmers and the general public may be informed of what is being done.

The Director of each Institution or the Head of each Laboratory aided will be required to submit to the Board, but not, as a general rule, for publication, an annual report containing full information as to the work which has been done at the Institution during the year.

Relationship to Local Institutions.

Each of the Research Institutions is intended to be the headquarters of research in its own particular group of subjects, but it is clear that circumstances may often arise which might make it impracticable for a Research Institution to take up a particular piece of work, *e.g.*, in a case in which local study was required or for which no member of the staff could well be employed. Where these conditions exist

and in cases in which local knowledge is essential, the Research Institution should co-operate with one or other of the twelve institutions to which the Board propose to make grants in aid of local technical investigations. Apart from the necessity for the study of certain questions in the locality in which they arise, it is very desirable that local institutions should be encouraged to study subjects of local importance, and wherever possible Research Institutions should assist and encourage them to do so.

The existence of a local staff available for advisory work and for the conduct of local technical investigations will also enable the Research Institutions to test the results of research under field conditions in different parts of the country, and will, in other ways, do much to secure the application of scientific research to practice. The Board attach great importance to this aspect of the question, since the scheme will fail in its object unless successful arrangements are made for adapting information obtained in the laboratory to field conditions and making it available for use by the practical husbandman.

The Board hope that the local advisory staff stationed at centres distributed over the country will form a link between the Research Institutions on the one hand and the practical farmer on the other.

Annual Grants.

The grants made to Research Institutions will be of the nature of annual grants-in-aid, and the Institution will be expected to contribute from its own funds, or to obtain contributions from other sources, towards the total cost of the research work in the group of subjects with which it is asked to deal.

Where an Institution is already engaged in research in any special subject, the grant from the Board must be used for the development and extension of the work, and not for the purpose of lightening existing expenditure.

Capital Grants.

The Development Commissioners have informed the Board that where a Research Institution requires further buildings for laboratories or expensive apparatus or equipment which

cannot be defrayed out of the annual grant, they will be prepared to consider applications for a grant of 50 per cent. of the capital expenditure required, on condition that the Governing Body of the Institution is prepared to provide the remainder from other sources.

In such cases the Governing Body, after consultation with the Board, should make a formal application to the Treasury * for a grant of the amount required.

SPECIAL GRANTS FOR RESEARCH.

A sum not exceeding £3,000 per annum will be available for assistance in respect of special investigations for which provision is not otherwise made.

The following conditions will apply to Grants from this Fund :—

1. Grants will only be made in respect of some definite subject of research to be carried on in connection with a University, University College, or other approved Institution in England and Wales. In the event of an application being made by an individual, it must be supported by a recommendation from the authorities of the Institution in connection with which the research is to be carried on, and accompanied by a statement that the necessary facilities for research can be given.

The subject of research must be connected with agriculture and its allied industries. The application must state fully the nature of the proposed research, the methods to be adopted and the qualifications of the staff by whom the work is to be undertaken.

2. Applications will be referred for consideration to the Advisory Committee on Agricultural Science appointed by the Board, and, in the case of applications which relate to subjects for which a grant is made to a Research Institution, the Committee will consider not only whether the proposed investigation is desirable in itself, but whether it is not more likely to be carried to a successful conclusion at the Research Institution.

3. No grant from this Fund can be made to a Research

* See Regulations made by the Treasury (Statutory Rules and Orders, 1910. No. 592).

Institution or to any person connected with a Research Institution except in connection with a subject lying outside the main group of subjects in respect of which a grant is made to the Institution, and the Board will require to be satisfied that the work proposed can be undertaken without undue interference with the principal work of the Institution or of its staff.

4. No grants will be made for the apparatus, re-agents, and other appliances which a reasonably equipped laboratory should provide. In certain cases, grants will be made for expensive apparatus which may be specially required, but in that case the apparatus will remain the property of the Board to be returned to them at the conclusion of the investigation.

In the case of the purchase of live stock the grant will cover the net cost only after deducting the sums received from the sale of the animals at the conclusion of the experiment.

Grants will not usually be made in respect of land, permanent buildings, or equipment, but in the event of any such grants being made exceptionally the amount will not exceed one-half of the total expenditure involved.

5. Grants will only be made from year to year, and will be for one year in each case. If it is desired to continue the investigation, a fresh application must be made.

6. A Report (not necessarily for publication) on the results obtained must be furnished to the Board in respect of each subject of Research not later than three months after the expiration of the period for which the Grant is made.

7. Detailed accounts and vouchers of the expenditure incurred must be rendered, and payments will only be made in respect of moneys actually expended. Any excess charges over and above the sum authorised must be defrayed by the Institution or individual carrying out the research.

COMMERCIAL ASPARAGUS CULTIVATION.

J. C. NEWSHAM, F.L.S.

Hampshire Farm School, Basing.

LARGE consignments of asparagus reach the British markets from Toulouse, the neighbourhood of Paris, and other parts of France, but our own soil and climate are capable of growing

as fine asparagus as any that is imported, and an extension of its cultivation amongst market gardeners and small-holders would be both practicable and profitable.

The principal advantage in asparagus cultivation, and one not possessed by most other vegetables, is that the value of this crop is high in proportion to its bulk, and it has been found to be a very profitable crop in suitable districts. In the vale of Evesham, asparagus occupies a foremost position among other vegetable crops; and there are probably other districts where the Evesham conditions exist.

Suitability for Small Holders.—The plant is one which is eminently adapted to cultivation by small holders. The demand for asparagus at a reasonable price is practically unlimited, and in low-rented rural districts the returns are satisfactory. The capital outlay is by no means great; less, in fact, than that involved in many other "special" cultures. In France and Germany asparagus is grown very largely by small holders.

Varieties.—As a rule, no great importance is attached to different varieties of asparagus. Growers on a large scale commonly sow seed from their own plants, and no question of new seed or new varieties arises. This seems largely due to the fact that sharp distinctions cannot be made between the different varieties of asparagus; they are not many in number, and the results obtained from any one of them depend largely on liberal manuring, good cultivation, and suitable protection from insect pests and diseases. Among the most popular varieties are Connover's Colossal, Argenteuil (Early Giant and Early Giant French), and Palmetto.

Soil Requirements.—The Evesham soils which are devoted to this crop range on the heavy side, from medium loams to true clays. It is said that any soil may be successfully adapted to asparagus culture, providing it is properly cultivated; but preference may well be given to a deep sandy loam. Comparatively heavy and too retentive soils should be lightened and improved by incorporating with them liberal dressings of lime, the ashes of burnt rubbish, road grit, etc.

The soils on which asparagus is grown in many parts of France, in the Department of Yonne for example, are very light, sandy, poor in clay and humus, and consequently very

subject to a great loss of manurial stimulants by rain. This is in great contrast to the conditions which obtain in the Evesham district, but the French growers have effected a marked increase in yield by employing artificial fertilisers in conjunction with farmyard manure; the latter is principally relied upon to furnish the soil with the humus it naturally lacks. Asparagus flourishes in deep alluvial sandy soils, devoid of water deposits below. Damp and water-logged areas are naturally unsuited to the crop unless they are thoroughly drained.

Preparation of Ground.—In the Evesham district many of the growers attempt no special preparation of the soil, and very often the seed is sown where the plants are to remain. By this means time is saved, but the strength of the plants and the size and quality of the “grass” are not improved, but rather the reverse. The ground is usually well dug in the autumn, and the subsoil broken up. The seed-bed must be of rich, clean soil; no good results can come of sowing the seed in foul land. When forming beds the deepest possible four-horse ploughing should be practised where possible. A great advantage is gained by preparing the ground as early as possible in the year, so that it may have settled down for seed-sowing late in March, or planting with young plants in April.

Manuring.—In making asparagus beds liberal quantities of well-rotted manure should be thoroughly mixed with the soil. Some growers use as much as 25 tons per acre, worth at least from 8s. to 10s. per ton on the ground; others withhold farmyard manure from this crop, preference being given to a dressing of artificials. The condition of the soil must, however, be taken into account, for on sandy soils poor in humus farmyard manure will undoubtedly give better results than artificials. Cowdung is used to good effect on such soils, or a mixture of cowdung and horse manure may be employed. The débris of mushroom beds also answers well for asparagus.

For general purposes, the following dressing is to be recommended per acre:—10 or 12 tons of dung applied in early winter, 5 cwt. of superphosphate and 4 cwt. of kainit broadcasted in February or March, and $2\frac{1}{2}$ to 3 cwt. of nitrate of soda as a top-dressing given in three applications at fort-

nightly intervals, commencing with the springing of the heads. The latter manure has a wonderful effect in hastening growth and development, and induces tender, succulent shoots and a delicate flavour in the produce; it also encourages healthy buds on the crowns for another season's work.

Sour soils need liming; on these and also on light sandy soils 8 cwt. of basic slag may be substituted for superphosphate; this must be applied not later than the beginning of March. Guano or sulphate of ammonia is often used in place of nitrate of soda, the former being especially useful where basic slag is used. Fish meal and dried blood are also employed rather extensively in some districts. No feeding is required during the first year after planting, but established beds are best manured with dung every year in June or July, after cutting has been completed; this annual dressing assists in preserving the retentiveness of the soil, especially where it ranges on the light side; it also maintains fertility and keeps the land in good heart. Salt has been largely replaced by kainit, which contains about one-third of its weight of common salt; this constituent, however, is not of much use except on poor or light sandy soils. Both salt and seaweed may only be used on such soils. When making spring applications of manure, special attention should be paid to its thorough incorporation with the soil; it must be forked in as deeply as possible without injuring the roots; otherwise it will prevent the spring sunshine warming the soil, and so delay the growth of the plants.

Seeds and Sowing.—The berries are gathered in the autumn, when quite ripe, and carefully preserved until the following spring. Seeds are sown in a nursery bed in March in drills 9 inches apart, and when the seedlings are a year old they are lifted and planted in rows from 3 to 3½ feet apart, and 1 foot apart in the rows. Hoeing is practised between the rows during the first year whenever weeds make their appearance. Some advantages may be claimed for the practice of sowing the seeds in good ground, wherein the plants are to grow and establish themselves permanently, for these sowings always form the most robust, permanent, and best cropping plants. The plants are not likely to appear until fairly warm weather sets in; hence little danger need be

feared from early spring frosts where sowings are made in February or the beginning of March. Too thick or too thin sowings must be avoided, the object being to secure an even plant when thinning out, without recourse to transplanting.

In row culture, the seeds should be inserted at a minimum depth of 2 inches, so that the resulting crowns may be well covered with soil. In some of the alluvial districts, where asparagus is cultivated on a somewhat large scale, it is customary to plant in rows 18 inches apart, every third row being omitted.

The resulting produce may amount to 6 or 12 heads per stool. Two or three year old plants are sometimes used, but it is preferable to employ one year old seedlings raised at home. In making the permanent beds, the French growers allow as much as 4 feet between the rows, the object being to give the plants an easy time from the start.

The Evesham growers practice two methods of planting. Firstly, the plants may be "channelled in" in a channel or wide drill 3 inches deep, the roots being placed on their sides head to tail all along the channel; they are then covered with earth by means of a hoe, and firmly trodden in. Secondly, the roots may be set at the proper distance apart—9 inches to 1 foot in the rows—and pinned down with setting pins. Crops of lettuce or dwarf beans may be raised during the first year as an intercrop, and these not only assist with the market returns, but also help to free the ground of weeds. When purchasing plants for planting, it is very important to secure freshly dug specimens which have been promptly despatched; the drying effects of sun and wind must at all times be avoided.

After-Cultivation.—This consists principally of manuring, earthing-up, cutting, and re-earthing during the season of cutting. Attention must also be paid to the eradication of weeds, and diligent search must be made for signs of the asparagus beetle. The stems are cut down in November and the ridges levelled. In the second autumn a slight ridge is formed about the plants by drawing a little soil up with the hoe, and the stalks are then left until the spring. A moderate covering of soil is placed over them in the following spring by digging a light trench between the rows, and in the

autumn of the same year the trench is completed and the plants fully earthed up. An old practice is to place a good covering of fine decayed manure along the rows, exactly over the crowns, during March or before the blades commence to show; some growers, however, prefer to apply the manure between the rows and not along them, and it is said that in this way the food reaches the feeding roots rather than the strong storage roots surrounding the crown.

The manure—or the earthing-up—should suffice to blanch a portion of the base of the blades; but under no circumstances should this be overdone, or quite half the entire length of the “grass” will be white and useless. In the fourth spring the beds are forked over, stones and weeds removed from the trenches, and the soil afterwards hoe-drawn into trenches. The beds are then kept clean by hoeing and weeding. Cutting is commenced and continued until about the end of June; if cutting is ever done in the third year, it must not be prolonged for more than two weeks. In the autumn the beds are dug over and a light dressing of 10 cwt. of well-rotted farmyard manure spread over the surface. Generally speaking, no stalks should be allowed to grow up to the middle of June, and many growers adopt a rotation in cutting, so that some portions of the plantation are cut for a shorter time than others to avoid exhaustion.

After the cutting season liberal cultivation is required, and every berry must be stripped off as soon as it is set; otherwise, if allowed to develop and ripen, the strength and vitality of the root will be impaired. It is customary to leave the tops as a sort of protection during winter, especially where the usual winter application of manure is withheld. Many commercial growers prolong the cutting period into midsummer, or even until July. The feeding, of course, largely determines the duration of the beds, though the space between the plants and the severity of the cutting may also have a great deal to do with it. Good commercial growers of asparagus rarely adopt the questionable practice of patching up an old plantation; they usually give the beds a lease of about 15 years for profitable production, although in some of the Evesham gardens, 20 years is not uncommon.

Pests and Diseases.—Asparagus suffers but little from

insect pests or fungoid diseases. Mention may be made of the Asparagus Beetle (see Leaflet 47) and the Asparagus Rust (*Puccinia asparagi*). The latter first appears in brown patches, and afterwards in black patches, which latter condition causes the stems to ripen off a dull brown colour instead of a golden yellow. It amounts, in fact, to a slow starvation of the roots. As yet, the disease does not appear to have had very serious effects among asparagus growers, and it does not seem that any noteworthy remedial measures have anywhere been adopted.

Marketing the Crop.—Asparagus is marketed in bundles of 25, 50, or 100 stems. The Evesham growers tie up bundles of 20 heads with raffia, and pack them in crates, half-a-dozen of the small bundles being tied up in one large market bundle. Flat-lidded baskets or hampers are to be preferred for marketing asparagus, as it is then possible to cover the stems with some greenstuff which will help to retain their freshness. After tying up a bundle, its appearance is vastly improved if the jagged ends are trimmed level with a knife.

Grading is of much importance in connection with this vegetable as with any other; the heads are sorted out into different sizes and tied up accordingly. The smallest heads are known as "sprue." In packing the bundles in crates, the different grades should be carefully labelled and named so that there will be no necessity to unpack them again in the market. A yield per acre of 250 doz. bunches of 25 heads each may be taken as an average, and 4s. per doz. bunches as a fair price for good quality produce.

WILLOWS AND THEIR CULTIVATION.

W. PAULGRAVE ELLMORE and THOMAS OKEY.

PREVIOUS articles * on this subject have dealt with the preparation of the ground, methods of planting, cleaning, cutting, &c. It is now proposed to indicate the approximate cost of preparing, planting, cultivating, and cutting per acre, and

* *Journal*, April, 1911, p. 12; and June, 1911, p. 207.

to give estimates for the probable yield for the first three years.

In estimates of this sort very great variations are possible in the cost of labour, rents and rates, and, what is of even greater importance, in the cost of the cuttings. These are purchasable at from 10s. to 20s. per 1,000, and the number required may vary from 24,500 per acre if planted 16 in. by 16 in. to only 4,840 when set out for the purpose of growing sticks. The following particulars should, however, enable any intending grower to estimate, approximately, the cost to him, according to local conditions. The figures for cuttings refer to selected healthy cuttings about 12 in. long, true to name, and of the best varieties of *Triandra*, costing 15s. per 1,000 at the growers.

	£	s.	d.
Ploughing old turf, per acre	4	0	0
19,360 cuttings, including carriage	15	0	0
Planting, if let by the piece	1	5	0
First year, hoeing four times over	2	10	0
Rent and Rates	1	15	0
Cutting and carrying off	1	0	0
Add interest on outlay of £25 10s.	1	5	0
Total	£26	15	0

The returns to be set against that expenditure vary very much, and are dependent on the season. Some land planted at Barrow, Leicestershire, in the spring of 1910, with Black Maul, Black Germans, Mottled Spaniards, and Long Skins, produced two tons to the acre, and these were sold at £4 2s. 6d. per ton on the ground, whilst the writers know of another case in which many acres were planted the following spring, and, owing to the very hot and dry summer, the crop did not pay for cutting. This is the usual risk experienced by those who follow agricultural pursuits, but it may be desirable to state that whilst willow-growing is indisputably a profitable undertaking, it is nevertheless more or less risky in the first year. When the heads are once established they go on yielding for many years.*

* The above figures deal exclusively with the crop when sold as green. For growers who prefer to buff or whiten their rods—operations that yield a satisfactory return for labour involved and capital employed—full details will be supplied in a subsequent article dealing with white and buff peeling.

The second year's outlay is much reduced, whilst the returns are much greater and involve less risk, owing to the plants having made a liberal growth of root during the first year, so giving additional support to the shoots :—

	£	s.	d.
Rent and Rates	1	15	0
Hoeing, four times over... ..	2	0	0
Cutting and carrying off, at 7s. 6d. per ton	1	10	0
Incidentals, and filling in plants that failed	0	15	0
5 per cent. interest on outlay of first year	1	5	0
Total	£7	5	0

The returns may be estimated at 4 tons of green rods at £4 10s. per ton (the market price of fairly grown first quality rods in the winter of 1911), or £18.

The third-year conditions for the grower greatly improve, and the expenditure may be regarded as typical of that for the next twenty years :—

	£	s.	d.
Rent and Rates	1	15	0
Hoeing, three times	1	10	0
Cutting and carrying off... ..	2	5	0
Incidentals, filling in, &c.	0	10	0
5 per cent. interest on first year's outlay	1	5	0
Total	£7	5	0

The returns should be 6 tons of green rods at £4 10s. per ton (this being an average price for first quality and growth), or £27.

By this time the crop is at its best for quality, and it should never look back again, provided proper care is taken and reasonable seasons prevail. Much heavier yields in certain exceptionally good seasons have been known; in fact, 12 tons to the acre of green one-year-olds have been cut, but such a yield is seldom obtained, and if so the yield is invariably far less the following season, owing, no doubt, to the abnormal drain on the plants.

The net results as shown in the above account thus work out as follows :—

<i>Expenditure.</i>				<i>Receipts.</i>			
	£	s.	d.		£	s.	d.
First year	26	15	0	First year	8	5	0
Second year	7	5	0	Second year	18	0	0
Third year	7	5	0	Third year	27	0	0
Total	£41	5	0	Total	£53	5	0

SUMMARY OF DIRECTIONS AS TO WILLOW CULTIVATION.

1. *Cuttings* should always be used for planting a willow ground. If two-year-old cuttings are used, arrangements should be made twelve months before they are required in order to ensure not only that the requisite sorts are delivered, but that the sets are cut from strong, healthy stock. Some surplus cuttings should also be planted for replacing any sickly or dead heads that may be found in the ground on the following year. Care should be taken in lifting surplus cuttings not to fracture the roots. Failing these, strong, healthy, full-length one-year-old rods may be used for mending the ground. If two-year-old rods are used, they should be cut off at the top of the first year's growth.

2. After planting, it is of the greatest importance for the first two years that a good loose tilth should be maintained on the top, especially where the soil is strong and liable to crack in a dry period. The rows must be kept clean by hoeing, and so preventing weeds from choking or retarding the growth of the willows.

3. Willows will not thrive on water-logged land, nor in peat bog, nor in dry soil of a sandy character. The best soil for a willow ground is a strong loam, in a position where it can be flooded at will, though the land must be well drained to provide against an abnormally rainy season.

4. In England willows may safely be planted at any time from the end of October to the middle of April, March being, perhaps, the best time if autumn planting is not resorted to. October planting is in all respects equal to spring planting, and allows other work to be done, such as cutting, sorting, and preparing for the cleaning and peeling season.

5. If possible, employ a good cultivator with which to break up the ground; this is more economical than the ordinary digging, and almost as good in its results. This work should be carried out in ample time, to make certain of the land being in proper condition for the subsequent planting, for if the cuttings are stuck into unbroken clods of soil, success can scarcely be expected to follow.

The best sorts should be procured, no matter at what cost, for basket willows. The cuttings must be healthy, and not

have been retarded in the previous season by fly-grub or willow-beetle attacks, and they must be adapted to the requirements of the market for which the produce is intended. A mixed crop is only of small value, whilst it involves a deal of extra labour at peeling time. Moreover, a little additional trouble and expense at the outset is well repaid, since a willow ground will last from twenty to thirty years if properly cut and cared for. All new plantations should be protected against ground game, for even the buds of the bitter varieties of willows are not proof against rats, rabbits, or hares.

7. After the cuttings have been planted, the ground around them should be thoroughly trodden down; if this is only done in a slovenly manner many cuttings will die.

8. If the bark of a cutting is much chafed or entirely broken, the cutting should not be used.

9. Basket willows will not pay if planted in small, out-of-the-way corners. Any patches of spare land may be planted for poles or timber, but not for basket willows.

10. Willows make good wind screens or nurse trees, and the species known as *Salix repens* will grow on the sea-shore sand-dunes. It forms an excellent shelter for seaside gardens and promenades, and is largely used at the best French coast resorts and golf grounds for that purpose. Some willows will grow on land occasionally overflowed with salt water, provided it is suitable in other respects, whilst slightly brackish tidal water suits all vigorous-growing sorts, as can be seen on the islands and banks of the Thames, Severn, Trent, &c.

11. Willows, when planted on the banks of rivers, possess an additional value by preventing denudation; their long, fibrous roots have great range and tenacity, and the shoots, if cut every three years, can be easily sold as sticks.

12. The inclusive cost of planting good-quality basket willows is about 25s. per thousand or a little over, based on 19,360 plants per acre, the number necessary if planted 18 in. by 18 in., which is the best distance for the choicer sorts.

13. All cuttings should be pushed into the ground from 10 in. to 11 in.

14. The number of cuttings required for an Imperial acre is as follows:—Planted 16 in. by 16 in., 24,502; 18 in. by

18 in., 19,360; 20 in. by 20 in., 15,681; 22 in. by 22 in., 12,960; 24 in. by 24 in., 10,890; 27 in. by 27 in., 8,604; 30 in. by 30 in., 6,970; 36 in. by 36 in., 4,840.

15. If willows are collected for scientific observation or botanical classification, any decision in regard thereto should be postponed until they have been grown in a trial ground. Varieties which for years have been regarded as distinct have often in two or three years so changed that no variations whatever have been recognisable. Willows are so materially altered by soil, climate, and situation that experts who have studied them for long periods are often deceived; but if the above plan is adopted much confusion will be removed, and many of the so-called species and varieties will be eliminated.

16. When cuttings are planted with a view to growing timber trees, all the first-year shoots should be cut to the ground, and any defective or crooked shoots removed at the end of the second year, leaving straight, clean stuff to grow on for timber.

17. To pollard a willow destroys its value as timber suitable for bat-makers, who, for maiden growth, will pay very high prices. Dr. A. Henry, of Cambridge, informs the writers that the selling price of cricket-bat willow timber on the ground often reaches 14s. per cubic foot,* and may even be higher. He also quotes an actual sale of a lot of trees, averaging 10 in. in quarter-girth, and each estimated to yield three rows of cricket-bats, at £3 11s. per tree. The produce from a pollard tree can only be used for fencing purposes; moreover, the head harbours all kinds of noxious insects, and wet and frost soon destroy the heart of the trunk.

18. In a country like our own, the wisdom of planting quick-growing timber cannot be over-estimated. The willow is not only one of the most remunerative trees to cultivate, but no wood commands a readier sale or is more difficult to obtain.

* It should, however, be noted that the lower part of the tree only is measured (about 7 feet in a ten-year old), the upper part being valueless for bat willow.

CREATION OF SMALL HOLDINGS FOR
AGRICULTURAL LABOURERS IN DENMARK.

DR. R. RAEDER.

MUCH attention has for a long time been given to small holdings in Denmark. The agricultural committees—on which small holders are often in a majority—have for many years awarded prizes and premiums, travelling scholarships, &c., to small holders out of their own funds and out of the sum voted annually by the Danish Parliament (£5,000). In addition, the Danish Budget annually provides £1,600 for literature, assistance to small holders, travelling expenses, horticulture, &c.; £4,000 for agricultural education, and some other items, making a total amount of £11,100.

Loans to Societies for the Formation of Small Holdings.—The State contributes directly to the formation of small holdings by allotting annually a sum of £11,100 for loans to societies having as their object the purchase and division of large holdings and their sale in small lots. The loans are determined by the Minister of Finance, and must not exceed the capital, in ready money, with which the society operates. The debt is not repayable for five years, but on the sale of a holding the Minister of Finance immediately determines the instalment repayable. Interest is charged on the loan at the rate of 3 per cent. per annum. No repayment is made during the first five years, except where holdings are sold. After this interest and instalments are paid by a charge of 4 per cent. Interest is only payable on the amount of the debt remaining undischarged; the remainder of the payment of 4 per cent. on the original loan, goes towards the repayment of capital. The dividends of the societies are limited to 5 per cent. on their capital, any surplus profits being employed for the benefit of the small holders.

Purchase of Small Holdings by means of State Loans.—In Denmark the law provides for assistance from the public treasury being given to agricultural labourers for the creation of small holdings. Among those who may also avail themselves of this assistance are unmarried women working for wages, persons cultivating small farms, rural artisans, brick-

making labourers, fishermen, &c., if they support themselves partly by working on the land.

To benefit from the advantages offered by the law, the applicant must be a Danish subject, must be between twenty-five and fifty years of age, must not have been convicted of any dishonourable act, must not have been a recipient of poor relief, must prove himself by the attestation of two respectable persons to be industrious, thrifty, and sober, and lastly, must possess a certain sum of money sufficient (according to the law) for the purposes of ownership of the small farm, for the acquisition of which his own resources are insufficient. The size of the holding must not be below one hectare ($2\frac{1}{2}$ acres).

The applicant, after having chosen a holding, forwards to the commission (appointed for this purpose in each department), his application containing all the necessary information, as to the situation and size of the holding, probable price of purchase, plans of buildings, and the amount required for buildings and for purchase of animals and fixtures. The total amount of the loan from the State should not ordinarily be more than £360; the absolute maximum is £440.

After examination of this information and inspection of the holding, the Commission accepts or refuses the proposal. If the Commission declares the applicant qualified, approves the price of the holding, and passes the buildings, stock, and equipment, the applicant is entitled to claim a loan from the State corresponding to nine-tenths of the value of the holding, which sum is secured by a mortgage on the land, buildings, and live stock. The interest is 3 per cent.; the debtor pays no instalment in the first five years; after this time interest and instalments are paid by a charge of 4 per cent. per annum; after repayment of two-fifths, instalments and interest are paid by a charge of 4 per cent. on the amount of the debt outstanding.

For these loans a sum of £222,400 is provided annually in the Budget, and a sum of £2,200 is annually allotted for the expenses of the Commissions. The total annual expenditure is thus £224,600.

Conditions attached to Ownership of Small Holdings.—

Although the small holder enjoys the full rights of ownership, the common law has been modified in some respects. Advantage of the benefits of the law can be taken only once and for one holding only. In case of removal or letting of the farm, the whole sum lent falls due without previous notice. The holding must always be used for agricultural purposes, and the stock must always be kept up and maintained in good condition. In case of sale, the purchaser cannot take advantage of the benefits of the law unless he himself can fulfil the qualifications required by the law. The widow of the owner succeeds according to the law of inheritance; in the case of a second marriage the husband must comply with the qualifications. Lastly, the small holder has the special advantage of disposing of his property by will.

Experience has shown that it is rather the married agricultural labourer of middle age who takes advantage of the benefits under the law. The large majority of small holders belong to the agricultural classes, and it appears that in his new rôle of owner the small holder still retains his character as a labourer, as he works on the average for wages 155 days out of the year.

During the ten years 1900 to 1910, 5,092 small farms have been established under this law. About £1,200,000 has already been spent by the State in the creation of these small farms, or £232 per farm; and as the State borrows money at $3\frac{3}{4}$ per cent., the annual loss is about £9,000, or 36s. per farm. There are about 180,000 small farms (houses with a holding of land) in Denmark, so that the number of farms established under the law during ten years is not more than 2·8 per cent. of the total.

Such are the efforts made in Denmark to keep agriculturists and labourers on the land and to improve their lot.

Naturally these new proprietors, who possess only a tenth of the value of their property, would be very quickly ruined by a fall in the price of butter and pork, especially if it occurred at a time when they have to pay ready money. So far by thrift and industry they have been able to make their way, and it is to be hoped that they will do so in the future. Up to the present the State, as creditor, has entered into possession of only a very small number of these small

farms, and their establishment seems an efficacious means of retaining the labourers on the land. As a matter of fact, the movement from country to town has diminished in recent years.

LAVENDER GROWING.

Lavender, which was introduced into England from the South of Europe in the sixteenth century, is grown commercially in a few districts in England where conditions have proved to be especially suitable to its cultivation. The principal lavender plantations are to be found in the neighbourhood of Mitcham, Carshalton, and Beddington, in Surrey, and at Hitchin and Canterbury. At each of these places the industry has been carried on for many years, and a local reputation for their lavender production has been established, which is no doubt a valuable asset. Recently its cultivation has been extended to Dorsetshire, where a somewhat large area at Broadstone has been devoted to it in conjunction with some other similar plants.

Although it is not improbable that there are many other districts where the crop could be grown with success, the difficulty of disposing of any large quantity of the produce in places where no still exists must be borne in mind. Distillers are often loth to take produce from a distance, owing to the fact that in order to get the best results distillation should take place immediately after harvesting. On the other hand, it may be pointed out that most large towns provide a fair market for bunches of lavender flowers.

Soil and Climate.—The lavender plant is probably more dependent on climate than soil, though a light loam overlying chalk and a sunny sheltered position sloping to the south or south-west are perhaps most favourable. It is successfully grown at Hitchin on a light gravelly sub-soil. Lavender is indigenous on the hills bordering on the Mediterranean, and conditions which closely reproduce those of its native habitat are necessary for its successful cultivation. As regards soil, good natural drainage, a light, fairly rich soil, and a warm position are essential, while a mild winter, with a low rainfall, followed by a warm, dry summer, favours a good crop and, what is equally important, a high-quality oil.

A naturally sheltered position should be chosen if possible, as the plants may be injured by high winds in summer; but the artificial shelter of hedges or walls is not usually recommended. The plant is very liable to injury by frost.

Preparing the Soil.—The ground should be thoroughly cleaned before planting by being allowed to lie fallow, the weeds being collected and burnt, and the soil ploughed and cross-ploughed to produce a good tilth. A medium dressing of dung may be given at the same time.

Planting.—Cuttings should be taken from established plants in the summer from June onwards, and struck in prepared beds, where they can be watered during dry weather. They should be put in 3 in. or 4 in. apart. The old custom of tearing off the woody branches of the plant and planting them thickly in trenches, though somewhat quicker in its results, is a bad one, as cuttings taken in this way are said to be more liable to attacks of fungus disease.

The young plants will be ready to plant out in their permanent positions in the following spring about May, when they should be dibbled in about 4 feet apart in rows and 6 feet between the rows. At this rate 2,000 will be required per acre, and if they have to be purchased the cost may be 16s. per 100, or less. After the ground has been stocked, the grower would provide new plants by striking cuttings himself.

In the first year the plants should be cut back to prevent them flowering; in the third and fourth years they will be in their prime; and after the fifth year they should be dug up and burnt. Practice in this respect differs. At Hitchin they are taken up at the end of the third year. In making a new plantation, therefore, planting should be extended over several years, so that too large an area may not have to be grubbed up at once. After the lavender plants have been cleared out, some other crop, such as potatoes, should be grown for a year or two before the land is again planted with lavender.

Harvesting.—The time of harvesting will depend on the character of the season, but it is usually early in August. Mr. F. Ransom, writing in the *Pharmaceutical Journal*, states that the earliest season recorded by him was in 1868, when it commenced on July 17th, while the latest was in 1894, when it was deferred till September 3rd.

The same writer estimates the average yield of oil at 12 lb. per acre if the whole area under cultivation, including that devoted to cuttings and to the first year's growth, is taken into consideration. But from 15 lb. up to as much as 30 lb. of oil may be obtained in a favourable season when the plants are in their prime.

The value of the oil varies according to quality, demand, and other seasonal conditions. From 100s. per lb. thirty years ago it fell to 20s. to 30s. per lb., but during the present year the price has risen, and 40s. per lb. may be given as the current wholesale price.

Apart from growing for oil, which is not advisable unless a lavender distillery exists in the neighbourhood, the plant may be grown for its dried flowers. There is a limited sale for these at Covent Garden, while they may also be sold locally. It is in the latter direction that small holders may be able to dispose of the crop from a small area. Caution, however, is desirable, as the normal demand is not large.

Disease.—The lavender plant is very subject to a fungus disease, which attacks the root and stem; indeed, the decline in cultivation which took place some years ago is said to be due to this cause, with the result that large quantities of foreign oil were imported, and to some extent supplanted the home product.

In view of the liability of the plant to this disease, it is very desirable (1) to root up and burn the old plants in order to destroy any fungus spores or mycelium that may be present, and (2) after sterilising the soil with quicklime to plant the ground with another crop for a year or two.

THE DESTRUCTION OF BRACKEN.

Bracken, Brake Fern, or "Fern" (*Pteris aquilina*, L.), is at once one of the most widely distributed and one of the most interesting of our native flora, for not only does it occur in many parts of the world, but its peculiar life-history shows that while it produces thousands of spores which require damp surroundings in which to grow and give rise to new plants, it is not in general propagated in this way in the

uplands, but by means of an extensively creeping and branching rootstock or underground stem.

Bracken occurs in many localities of Great Britain to such an extent that it overruns dry upland pastures and rough grazing land, and even begins to invade good grazings. In many positions it largely increases the cost of planting forest trees, and also reduces the rental value of sheep pastures, and even of arable land. The evil is in some districts very serious in character, and great difficulty has been experienced in keeping the pest within bounds, while experienced farmers have failed to eradicate it. So densely does it grow on occasion that practically all other vegetation—at any rate, useful vegetation—is entirely suppressed. It is especially prevalent on light sandy soils, or soils in which lime is very deficient or absent. It is found high up the mountain side, in suitable situations at ordinary levels, and on the sea-coast almost down to high-water mark.

In their final report the Committee of Inquiry on Grouse Disease remark that : “There can, unfortunately, be no doubt that bracken is spreading considerably on very many moors in the south and west of Scotland, and that not much effort is being made to combat this pest. Thick bracken will rapidly destroy both grass and heather, but of the two it is probable that the heather will be the more easily destroyed; and if bracken has once taken possession of ground for a period of years it will be found, on clearing the ground by regular cutting, that grass will probably come where heather formerly flourished. It is a common experience when burning fairly old heather to find that the few bracken stems which existed among the heather give rise to a much thicker crop on the bare ground, and may entirely choke the fresh growth of young heather.”

Method of Propagation.—Briefly, the life-history of bracken is as follows :—The mature foliaceous plant produces myriads of spores on the under-surface of the leaflets, each mature spore being a potential parent of a bracken plant. Under suitable conditions of temperature and moisture the spore develops into a small, flat, green, scale-like organ called the *prothallus*, this in due time producing male and female organs, which finally give rise to a young fern

plant similar to the mature bracken with which the cycle started.

The foregoing system of reproduction, however, seems to occur but rarely in Nature in the dry positions in which bracken is chiefly harmful to the farmer, though it may be more frequent in damper situations. The spores from the bracken leaves can be readily grown artificially.

The second and common system of propagation is by means of branching and creeping underground stems or rhizomes, only the leaves with their stalks appearing above ground. During the summer months the leaves manufacture far more food material than is requisite for their own growth and the production of spores, and this excess food they store in the creeping rootstock for the purpose of starting the new growth in the following spring. It is on this important fact—not, as many persons may imagine, on the prevention of the production of spores—that the eradication of bracken chiefly depends.

Eradication of Bracken by Cutting.—Many plans have been suggested for the eradication of bracken, but the principle involving successful operations consists in cutting it down as soon as the balance of stored food material has been most nearly exhausted in producing a wealth of foliage, and repeating the operation at successive intervals as the plant puts forth new leaves in an endeavour to fulfil its natural functions—the production of spores and the storage of a fresh supply of food in the rootstocks. With the repeated cutting these natural functions are prevented; the plant uses up its capital of food reserves, the removal of the leaves renders it incapable of manufacturing further food, and the exhaustion and ultimate death of the plant follows. The first cutting may most usefully be carried out about the middle or end of June, according to locality, the bracken having by that time used up a large proportion of its food reserves and being near maturity. Thereafter cutting should be repeated as soon as the bracken reaches the stage when the new leaves begin to unfold. Cutting may need to be repeated two or even three times in the first season after the June cutting, and two or three times altogether in each of the two or three subsequent years, but with the gradual elimination of the bracken comes the reward. In experiments conducted at Auchentorlie

(Bowling, N.B.) by Lt.-Col. Ferguson-Buchanan, the acreage of bracken practically exterminated since 1905 is 500 to 600 acres, at a cost of about £350. The cost was found to be well repaid, excellent grazing resulting, while it had the advantage that the shepherd could view his ground in less than a quarter of the time taken when bracken covered the ground, and the sheep kept off the heather owing to the extra grazing available. In the experiments referred to, clean cutting with scythe and hook was found to be more effective than any other method.

Mr. S. Millar has been kind enough to inform the Board that bracken has been cut for four years (1908-11) on 200 acres of Tighnabruaich Hill Farm in Argyllshire. The first cutting took place between early May and the end of June, 1908, when the fronds were but a few inches high and quite tender. A second cutting took place between July 1st and August 15th, and a third between about August 15th and September 15th, while some 50 acres of the area were again cut over before the end of September of the same year. The result was that in 1909 the growth was decidedly reduced and weaker, and cutting was carried out three times. In 1910 the bracken was in some places very thin and short, and only one cutting was required, but in other places two and even three cuttings were necessary. In the present year (1911) the bracken has been very scarce (except on 10 acres) and very short, not more than 6 in. high, but the ground was all gone over, and the bracken cut early in July. On the 10 acres excepted, the bracken was more prevalent, but very short, and was cut twice. It is anticipated that next year no cutting will be necessary. Mr. Millar states that the cost of cutting to date has been £190, and the pest is considered practically exterminated. The 200 acres which were before useless are now good sheep pasture, and have proved worth reclaiming, provided the bracken does not grow again, at any rate for a considerable time.

The tool used for cutting in this case consisted of a light wooden handle 4 ft. long, bearing at the end a flat curved piece of iron sharpened on both edges; this cuts the young bracken very easily, it cuts on both swings, and the workman does not require to bend.

In another case in North Wales 240 acres of bracken were

bruised and beaten down with sticks in June, October, and November, 1909. In 1910 the operation was repeated in June, and the result has been a very considerable decrease in the bracken.

It is considered by some authorities that one of the simplest methods of eradicating bracken consists in running chain harrows, or heavy beam and bush harrows, over the ground when the growth is young and tender, and repeating the operation as often as new growth attains a few inches in height. Beating down with sticks is perhaps equally effective, but takes longer, and is hence more expensive.

Effect of Liming.—An important factor in the successful growth of bracken is the absence or comparative absence of lime, and it has been found that where bracken is plentiful an application of lime results in its suppression. Liming at the rate of 10 to 40 cwt. per acre might usefully accompany regular cutting, the result to be expected within three to five years being the eradication of the bracken and its gradual replacement with excellent herbage.

Bracken does not commonly encroach on land which is regularly cultivated, and putting land covered with bracken under the plough and deeply breaking it up may usually be considered a certain means of eradication.

Influence of Stock.—A note which appeared in this *Journal* in February, 1909, page 844, referred to the influence of cattle on the eradication of bracken, and it would appear that close grazing with cattle tends to reduce the pest, the animals not only eating much of it when young, but trampling it down. Where cattle have been replaced with sheep a considerable increase in bracken has been noted. Cases to the contrary, however, have also been quoted, in which cattle have had no appreciable effect on the bracken.

In the course of their investigations the Committee of Inquiry on Grouse Disease noticed that bracken very seldom grows on crofter "soumings" where there are many ponies, and they observe that while they do not feel that they have enough evidence on the subject to claim that this is a solution, they mention the fact as one which may be worth further inquiry and experiment.

It has been stated that where it has been possible to prac-

tise it, irrigation with spring water has been adopted for clearing land of bracken with complete success, though in some cases the plan has proved useless.

Insects Attacking Bracken.—A number of insects have been recorded as attacking bracken, among them being:—(1) *Hepialus velleda*, a swift moth, the caterpillars of which tunnel in the underground stems or rhizomes towards the end of the year; (2) *Euplexia lucipara* and *Hadena pisi*, two noctuid moths, the caterpillars of which feed on the foliage, and allies of which bite the plants across; (3) *Panagria petraria*, a geometrid moth, the caterpillars of which feed on the plants.

Bracken for Fodder.—It may be mentioned that young bracken has been employed as a green fodder, and has even been ensiled for stock-feeding, the process being to chaff it and mix it in equal proportions with new straw chaff, salt it evenly, and tread it into a properly constructed silo. It is then covered with clay to induce heating and prevent firing, the material becoming pleasant to the smell and relished by stock. This question, however, requires further investigation.

Bracken for Litter.—The use of bracken as a litter was dealt with in the *Journal* for October, 1908, where it was shown that its manurial value is about 50 per cent. higher than that of straw, while it possesses greater power of absorbing ammonia and urine than an equal weight of straw. "Dung made from bracken may be expected to be somewhat richer than dung made from straw. On the other hand, it takes longer to decompose in the soil, the fibrous woody stems being only very slowly attacked. It therefore opens up the soil to a greater extent than straw-made dung would do, and is for that reason likely to be more effective on a heavy clay than on a light sandy soil."

HEATHER BURNING.

The question of the correct and most successful procedure to be adopted in regard to heather-burning has in the past given rise to much debate, and there has been considerable divergence of opinion on the subject. What was good for the farmer by extending the area of grazing for sheep might not be favourable to the sportsman in encouraging an increase in

grouse, and action that might at the outset seem to have a favourable effect on grouse-breeding might ultimately end in disaster in the shape of a general outbreak of grouse disease. This being the case, considerable interest attaches to the chapter on heather-burning contributed by Lord Lovat to the Final Report of the Committee of Inquiry on Grouse Disease,* in which the subject is dealt with at some length.

Briefly, it may be stated that the Committee are distinctly of opinion that the interests of the farmer and the sportsman are identical, and that the burning of the heather is equally advantageous to both. In the past the use of many moors for grazing has been subordinated to their employment as a breeding-ground for grouse, but now that it has been shown on such high and unimpeachable authority as that of the Committee referred to that the two purposes are in no way inimical, the Board hope that landowners and the owners of shooting rights will endeavour to encourage the regular and systematic burning of the heather, and thus enable the moors to carry more sheep than they do at present. The following is a summary of the Committee's Report:—

Decrease in Heather-burning during the Last Century.—In the early days of grouse-shooting, from about 1800 to 1850, the heather of the moorland was in the majority of cases burned by the farmer and his shepherds, the methods being rough and ready, but effective, the object being to burn one-tenth of the moor annually. During this period shooting rents were low. Subsequently, when the value of grouse-shooting became enhanced, the rights of burning were transferred from the shepherds to the keepers. The result was that, while better cover for shooting over dogs was obtained, there was not only a drop in the average bag of grouse, but also in the grazing value of the hill-ground—a result neither foreseen nor desired. The reason was that long heather was aimed at, and the keeper not only stopped the shepherd from burning big stretches of heather, but from burning the heather at all.

The procedure followed ended in the whole effect of the earlier burning being lost by the 'sixties of last century, and in many districts where non-burning was at its height not

* The Grouse in Health and Disease: being the Final Report of the Committee of Inquiry on Grouse Disease. 2 Vols. Smith, Elder & Co. 1911. £2 2s. net.

only were there few birds and frequently recurring outbreaks of disease, but the graziers' complaint that there was not enough young heather and grass to feed the sheep-stock became more and more common, and big sheep-farmers in many districts came to rent the shooting as well as the grazing of their holdings in order to get control of the heather-burning.

In 1871 and 1873 the Game Laws Commission investigated the relations of the sporting and farming interests, and some very interesting facts were elicited. Not the least important of these facts was the similarity of heather conditions required for sheep and for grouse. This was brought out by the evidence of farmers who had leased the sporting rights of their farms, and who spoke of doubling and trebling the bag of grouse by burning tracts of ground in order to get the land back into the proper rotation for sheep, viz., one-tenth of the moor burned per annum.

A great outbreak of disease occurred in 1872 and 1873, and about this time the patch method of burning came into fashion, and the proportion burned dropped from one-tenth to one-hundredth part of the moor per annum. It is to the small size of these patches and the consequent small proportion of the moor annually burned, more than to any other cause, that the persistent recurrence of grouse disease is due.

Burning Recommended by the Committee.—Taking all things into consideration, the Committee recommend a fifteen years' rotation, i.e., that a fifteenth part of the moor should be burnt annually. Under this system the amount of edible heather represents 60 per cent. of the total acreage of the moor, compared with 9 per cent. in the case of a hundred-year rotation, or 18 per cent. in the case of a fifty-year rotation. This means that a well-burned moor can carry seven and a half times the stock of the moor burned on a hundred-year rotation, and nearly four times as much as that of the average moderately burned moor.

"The object to be aimed at is clear, that every bird should have its tufts to nest in at the edges of the burned ground, its bare ground to sun itself in and on which to take out its chicks; its older heather for concealment, its breast-high 10-inch heather for feed, its well-matured heather for seed and shelter in winter, and, finally and of most importance, its

six- to fifteen-year-old heather to keep it in health and vigour in early spring."

Methods of Burning.—Old heather should be burned in strips, for when old stick heather is burned the fire is so hot that the roots are charred and killed; in this case regeneration can only proceed from seed, and, if the burned areas are narrow, self-seeding is materially helped by wind-blown seed. While it is necessary to burn off blocks of old heather in strips, it is advisable at the same time to get a considerable area burned on one beat of the moor.

Sheep always rush to the newly burned ground for the sweeter grasses that grow there, and unless there are good stretches of burned ground for them to feed on, they will concentrate on the small isolated patches and pull up all the young heather plants as they spring from seed. Everyone who is acquainted with a moor in autumn must have observed the hundreds of little brown shrivelled-up heather seedlings pulled up by the sheep's teeth on every patch of newly burned ground. To obviate this wholesale destruction it is sometimes considered advisable, where the sheep stock is heavy and the moor has a tendency to go back to grass, to fence off areas of old stick heather for two or three years after burning. This gives the young heather a chance of coming away, and once rooted it can defy the efforts of the stoutest-toothed "black-face."

Old heather should, whenever it is possible, be burned "against the grain," that is to say, against the lie of the heather sticks. "Back-firing" or burning against the wind gives a very clean burn, the fire travels slowly, and destroys not only a larger percentage of the stalks of the heather, but also burns into the "fog" or moss which surrounds the roots of old stick heather. Owing to the shortness of the time available for burning in an average year, dampness of the soil, &c., "back-firing" is not always possible. In the case where an overcrop of partly charred sticks have been left it is advisable to run a fire through the burned ground a second time if possible in the second or third year following the first burn. This second firing has the effect of clearing the ground of the charred heather sticks and burning off the moss, which, having been exposed to the air, is drier than at the first time

of kindling. This affords a good clear seed-bed on which the wind-borne heather-seeds rapidly establish themselves.

In the interest of both sheep and grouse, wet "flow" * ground should be burned in big stretches outside the ordinary rotation—if possible, once in every six years. Flow ground usually overlies deep, damp peat, and is therefore protected from the full effects of the fire; the grass and the stunted heather in consequence come away quickly from the root. It is often difficult to burn flow ground owing to the heather being broken up into tussocks, and the driest weather should be chosen for the task.

Period of Burning.—Heather can be burned at all times of the year in England. In Scotland, by statute, heather-burning is confined to the period from November 1st to April 10th. On high, wet moors an extension of the period to April 25th can be obtained. In Wales, by custom, burning is usually carried on during the spring months.

Autumn Burning Recommended.—As soon as it was established that the health of the grouse depended not only on the distribution of edible heather, but also on the total extent of the supply, it became a matter of primary interest to the Committee to decide whether in their opinion the burning season should be extended, and how the results of autumn and spring burning were to be compared.

The inquiries made led the Committee to the conclusions that in the interests both of sheep and grouse autumn burning is advisable on all moors, that it is necessary on large moors, and that it is the only possible method of getting high ground with a northern exposure into a proper rotation of heather crop.

In the North of England the evidence goes to show that, whether springing from the root or from the seed, the growth

* By "flow" ground is meant the black stretches of peaty land where, owing to the retentive nature of the soil, the surface water lies in pools and channels between tufts or tussocks of heather; it is to be distinguished from marshy or boggy land where the water lies in suspension below the surface. Flow ground cannot as a rule be drained owing to the absence of a natural "fall," and even when drains are cut the nature of the soil is not sufficiently porous to make them effective. Flow ground grows a poor quality of stunted heather usually mixed with sour-looking grass, yet grouse are often found to frequent it during the daytime, especially when it lies on a high plateau or immediately under the crest of a ridge.

of heather following autumn and spring burning is identical. On the more northern moors the heather is probably slightly slower in reaching maturity after autumn burning, especially on shallow peat or hard ground.

At least 75 per cent. of the larger moors examined by the Committee proved to be insufficiently burned, and they consider that in many cases an extension of the burning period would enable a larger stock of both sheep and grouse to be maintained. In view of the fact that autumn-burning is necessary in the interests of the health of the grouse and sheep, they suggest that a Bill making it permissible in Scotland to burn after October 1st should be introduced into Parliament without delay.

Opinions of Sheep-farmers on Heather-burning.—With a view to ascertaining the opinions of sheep-farmers on the subject of heather-burning, a meeting was arranged between representatives of the Committee and a number of sheep-farmers from different districts. The views expressed clearly indicated that in the opinion of sheep-farmers there is not enough heather burned for either grouse or sheep on the majority of moors in England and Scotland, and that there is a general wish on the part of sheep-farmers on heather ground that more heather should be burned. The farmers further stated that they would be glad to try autumn burning in co-operation with owners, and that they would probably give more assistance in the autumn than in the spring, because in the spring they are usually busy with sheep that have returned from wintering, and with the superintendence of their stock during the lambing season. They considered that it matters little whether autumn-burned heather grows as well as spring-burned heather, the great object being to get rid of the large tracts of old useless heather which are of no value either for grouse or sheep.

It was also pointed out that where heather is allowed to grow too old, there is a danger of its place being taken by bracken after burning, whereas if the heather is burned young the fresh growth has more vitality, and usually defeats the bracken.

ENGLISH AND AUSTRALIAN LAYING COMPETITIONS.

EDWARD BROWN, F.L.S.

FOR thirteen years the Utility Poultry Club has organised laying competitions, which have been held in various parts of England. That society was the pioneer of this method of endeavouring to show what can be accomplished as a result of breeding, selection, and management in egg-production. Nearly all these contests have been for periods of sixteen weeks, commencing in October and terminating in February, thus covering the time of greatest scarcity in egg supplies. The number of eggs produced by the winning pens have ranged from 127 (1900-1901) to 276 (1902-1903), the first-named being exceptionally low, the latter very high. These gave averages of 31.75 to 69.0 eggs per hen, as four birds were included in each lot. In 1907-1908 a twelve months' competition was held, in which the leading pen gave an average of 165.66 eggs per hen. In that contest six birds formed each pen.

The example thus set has been followed by other societies in this country, and by Departments of Agriculture and societies in British Colonies. It is announced that similar contests are to be held in the United States of America. The most successful contests have been in Australia, where remarkable records have been made, especially in South Australia, where competitions have been held annually for several years.

It is desirable, therefore, to consider what is the real value of these competitions. The Utility Poultry Club announces that they are not held "to determine which is the best breed," and that "good laying is a question of strain and not of breed," though this latter statement can scarcely be accepted without qualification, as good laying is probably a question of breed and strain combined with efficient feeding and management.

That laying competitions have proved a great stimulus to the poultry industry, and influenced farmers and others to pay a greater amount of attention to selection of their fowls, cannot be questioned. In this direction the benefit has been enormous. That they have had an equal influence upon the productiveness of fowls generally is not so apparent. That

successful competitors have obtained a valuable advertisement for their stock is undoubtedly true, but it should be borne in mind that the conditions under which these contests take place are highly artificial. To keep hens for egg-production in lots of four and six would involve heavy expenditure for equipment and labour in management, which would be unprofitable upon an ordinary farm. A preferable test would be for twenty or twenty-five hens in each flock. Finally, we have yet to learn what is the permanent effect upon the progeny bred from the heavy layers in these competitions.

Generally speaking, interest is mainly centred upon the performances of the prize-winners, whose records are heralded as of supreme importance. By so doing the true value may be disregarded. Prizes are essential to secure competitors, who are stimulated to enter for the chance of winning these trophies, and for the monetary results which follow from their success. I venture to suggest that the real meaning of laying competitions is not to be found in the results obtained from the prize-winners, but rather in the average production of all the competing birds. It has long been known that in nearly all races of carefully selected hens a few will lay in excess, in some cases largely so, of the racial or strain average, and that probably as many will be correspondingly below. Profit will depend upon the mean in relation to the cost, and it is the raising of that mean which is desired. If we know which are the better layers, and by using them as breeding stock are able to improve the average, that is a real gain. Otherwise the benefit is not maintained, and it may be non-existent. Experience goes to prove that an animal excessive in any direction as compared with its breed average produces progeny which revert to that average, and frequently fall below it. It is, therefore, the mean upon which attention must be concentrated.

In spite of the abnormal conditions under which these contests are held, we may appreciate their value by careful examination of the total results. Selected pullets from many breeders are brought together, are kept under identical conditions, and are fed and managed in the same manner from the time they are received.

For this purpose I have selected the Utility Poultry Club's

contests for 1910-1911, and the South Australian contests ending March 31st, 1911. In both instances there were two places where the trials were conducted. The former were for sixteen weeks, the latter for twelve months. Therefore, actual comparisons are impossible. Further, the laying of each hen is recorded in the English tests, which are much more complete, whereas we have only the pen totals for Australia. There are, however, important lessons to be drawn.

English (Utility Poultry Club) Competitions.

Two of these were held, one in Lancashire and the other in Worcestershire. In the former there competed 34 pens (four in each), or 136 birds; in the latter 78 pens, or 312 birds. The final results in totals were as follows:—

Section.	No. of Eggs Laid.	General Mean.
Northern... ..	6,830	50·22
Southern... ..	12,362	39·62
Total	19,192	42·84

The differences are considerable, namely, that the birds competing in the northern section gave an average of 10·6, or more than 25 per cent., above those in the southern section. From the returns published it would appear as if a large proportion of the birds moulted, and a smaller number became broody, more especially in the southern section. Those which kept their feathers came out best. That fact is suggestive. Too early hatching is almost as bad as when it is unduly delayed.

In Diagram I. are shown the variations in number of eggs produced by individual hens, indicating how many such hens laid the respective numbers of eggs. I have been compelled to take the eggs laid in groups of five, otherwise the diagram would have been unduly extended. It will be seen that 17 hens failed to produce a single egg, 12 hens laid 1 to 5 eggs, 46 laid 46-50 eggs, and so on, until we arrive at the one which laid 103 eggs. Although the frequency curve has considerable irregularities on both sides of the mean, these variations are in the main very uniform. It is satisfactory to note that the greater number of hens were above the mean. Had it not been for the 17 eggless drones, the mean and the highest point would have been identical. The rapid fall above 60 is very marked.

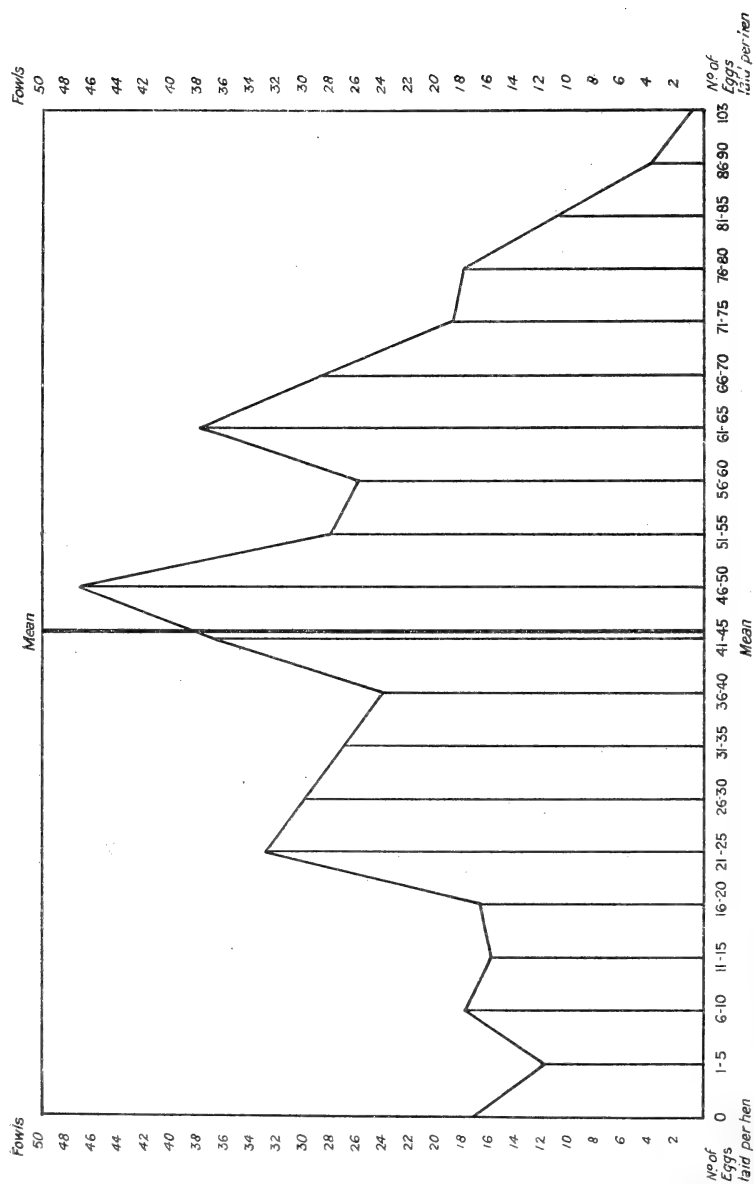


DIAGRAM I.—VARIATIONS IN NUMBER OF EGGS PRODUCED IN ENGLISH (UTILITY POULTRY CLUB) LAYING COMPETITIONS 1910-11 (Individual hens).

TABLE I.—Standard Deviations in English (U.P.C.) Laying Competitions, 1910-11.

(The long transverse line shows the mean of all breeds combined; the short line in each column the mean of that breed.)

LAYING BY HENS OF BREEDS COMPETING.														
No. of Eggs laid per hen.	Standard Deviations.	Entire Flocks, 448.	White Wyan- dottes, 212.	Silver Wyan- dottes, 8.	Buff Orping- tons, 68.	White Orping- tons, 20.	White Leghorns, 48.	Black Leghorns, 16.	Buff Rocks, 32.	Ancona, 8.	Rhode Island Reds, 24.	Speckled Sussex, 8.	White Bresse, 4.	No. of Eggs Laid per Hen.
0	-42.84	17	8	—	1	2	3	2	1	—	—	—	—	0
1-5	-39.84	12	4	—	—	3	4	—	—	—	—	—	1	1-5
6-10	-34.84	17	4	—	4	1	1	—	1	—	2	—	—	6-10
11-15	-29.84	16	8	1	3	—	1	1	2	—	—	—	—	11-15
16-20	-24.84	17	5	—	1	—	5	1	1	1	1	1	1	16-20
21-25	-19.84	34	15	2	2	1	4	1	3	—	4	1	—	21-25
26-30	-14.84	30	12	1	7	—	2	—	2	—	3	2	—	26-30
31-35	-9.84	27	12	—	4	3	4	2	—	—	—	2	—	31-35
36-40	-4.84	24	12	—	5	2	—	—	—	—	1	—	—	36-40
Mean of Entire Flocks														
41-45	+0.16	40	16	1	8	3	3	4	3	—	—	—	—	41-45
46-50	+5.16	46	21	1	6	2	3	2	6	—	2	2	—	46-50
51-55	+10.16	27	13	1	3	—	5	—	4	—	3	—	—	51-55
56-60	+15.16	26	12	—	5	1	2	—	3	2	1	—	—	56-60
61-65	+20.16	39	25	—	7	—	3	1	—	—	—	—	—	61-65
66-70	+25.16	26	12	1	2	1	3	1	2	2	2	—	—	66-70
71-75	+30.16	19	9	—	2	—	2	—	2	1	3	—	—	71-75
76-80	+35.16	19	16	—	2	—	—	—	—	—	1	—	—	76-80
81-85	+40.16	9	3	—	4	1	—	—	—	1	—	—	—	81-85
86-90	+45.16	2	1	—	1	—	—	—	—	—	—	—	—	86-90
103	+60.16	1	—	—	1	—	—	—	—	—	—	—	—	103
Mean	...	42.84	44.58	36.5	47.72	32.7	35.92	29.44	43.93	60.62	42.46	33.37	20.5	Mean
No. of hens below mean		209	97	4	37	7	26	6	10	3	11	5	2	Below
" " above "		239	115	4	31	13	22	10	22	5	13	3	2	Above

One of the most interesting features is the difference of individual hens in the same pen, which in some cases is very great. It would be of value to know whether the hens sent in one pen were sisters, or merely birds selected by the competitors regardless of relationship. As showing the importance of even laying, the four White Wyandottes, which stood highest in the competitions with 301 eggs (an average of 75.25 eggs), produced 73, 75, 76, and 77 respectively, though one is stated to have gone broody. As against that record the birds in the Buff Orpington pen, containing the hen which made the highest individual score (103 eggs), produced 8, 48, 49, and 103 eggs respectively. Two of these moulted and two became broody. Other similar instances could be cited, but these will suffice. A careful study of the figures published reveals that to a large extent the position secured was determined by whether broodiness or moulting supervened. Perhaps the uncertainty in these directions adds to the interest of the competitors. Breeders cannot have any guarantee against either. In this case, again, the average is all-important.

In Table I. the figures are worked out for the entire flock, and also for each breed. Here are shown standard deviations from the mean of all the contestants and of the respective races. For example, with the 68 Buff Orpingtons the breed mean was 47.72, which was 4.88 above that of the entire flocks; one hen did not lay at all. She was, therefore, 42.84 below the general mean; another hen laid 103 eggs, and was 60.16 above the general mean, and so on. Thirty-seven hens were below, and 31 above the breed mean. In view of what is shown in connection with the South Australian competitions, the White Leghorns came out badly. Only 48 birds were entered for competition, of which three did not produce a single egg; the breed mean was 35.92, or 6.92 below the general mean; 26 were below, and 22 above the breed mean. The highest breed place was occupied by Anconas, with a breed mean of 60.62, but of these there were only eight competitors. With smaller numbers the risks may be minimised.

South Australian Competitions.

The contests in Australia are promoted and controlled by the Agricultural Departments, and are on a larger scale than is usual in this country. They have been for one and two

years, a period which is much more satisfactory as a test than sixteen weeks. During the last year two were held in South Australia, one at the Roseworthy College, in the north of the State, and the other at Kybybolite, in the south-eastern section, where it is recorded that "the country is very wet and cold in winter, which is of much longer duration than in the north." In the former 89 pens (six in each), or 534 hens, competed; in the latter were 40 pens, or 240 hens. The final results in totals were as follows:—

Section.	No. of Eggs Laid.	General Mean.
Northern	102,723	192·3
Southern	35,065	146·1
Total	137,788	178·04

Here again the differences are very great, in that the birds in the northern competition gave an average of 46·2 eggs, or more than 30 per cent., above those in the southern competition. In twelve months the number which moulted or became broody would be equalised to a greater extent than when the period is limited to sixteen weeks. No record, however, is given upon these points as in the English report.

Unfortunately, for the sake of comparisons, we have to be contented with the performances of each pen, as the individual laying is not given. Consequently I am unable to deal as fully with the Australian contests as the English. Had such figures been available they would have proved equally interesting, and enabled us to see whether the same variations were found between members of the individual flocks as in England.

In Diagram II. is shown the average number of eggs produced by the respective pens, indicating the grades of pens in relation to their average productiveness, again placing them in groups of five. It will be seen that one pen produced an average of 100-105 eggs; that ten pens laid an average of 161-165 eggs; and that one pen attained the maximum by an average of 252·16 eggs, or a total of 1,513 in all, of a selling value of £5 7s. 11d. The mean for all the flocks combined was 178·04, and as a proof of the theory of frequency curves as applied to egg-production when dealing with large numbers, we find that one pen was at the top and one at the bottom, and that the numbers of pens below and above the general mean were 64 and 63 respectively. Nothing could

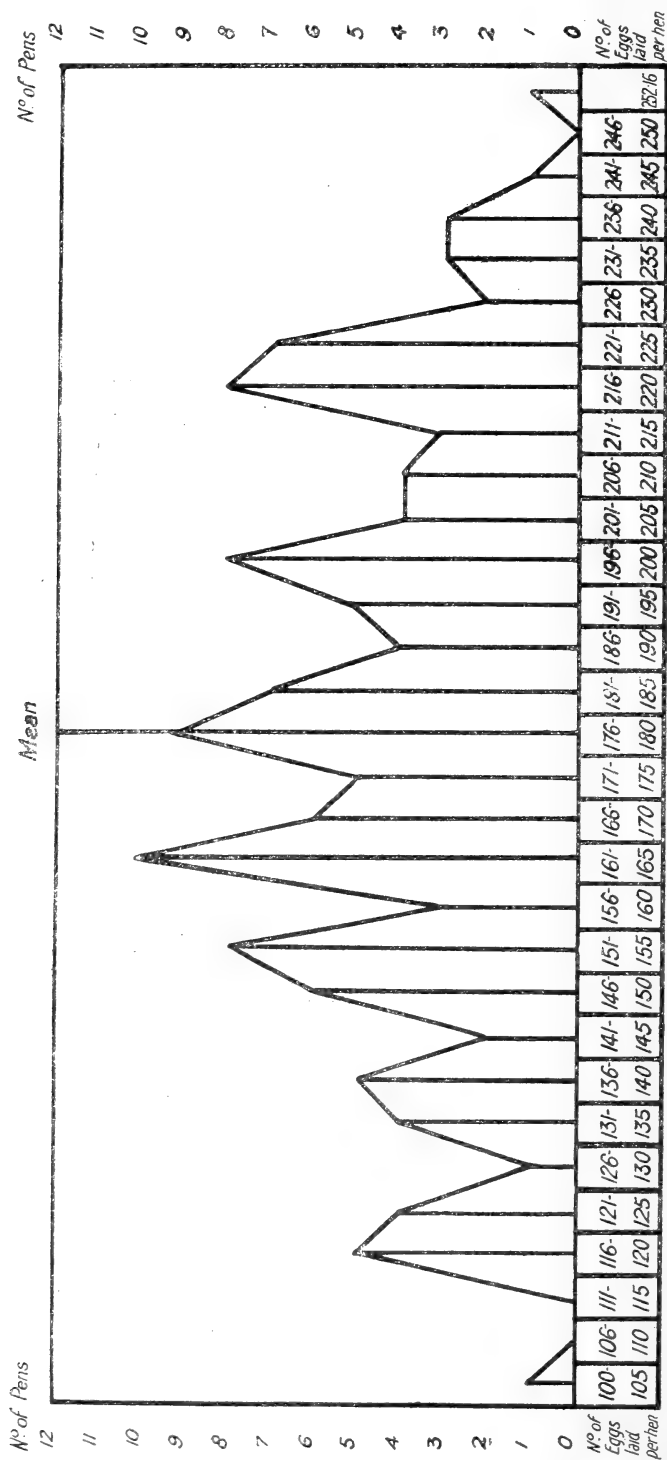


DIAGRAM II.—VARIATIONS IN AVERAGE NUMBER OF EGGS PRODUCED IN SOUTH AUSTRALIAN LAYING COMPETITIONS, 1910-11
(Pens containing 6 hens).

emphasise more strongly that the test of these laying competitions is to be applied by the mean, and not by what a few heavy layers may yield.

TABLE II.—Standard Deviations in South Australian Laying Competitions, 1910-11.

(The long transverse line shows the mean of all breeds combined ; the short line in each column the mean of that breed ; the figures in columns represent number of pens.)

No. of Eggs laid per hen.	Standard Deviations.	LAYING AVERAGES OF BREEDS COMPETING.								No. of Eggs laid per hen.
		Entire Flocks, 774.	White Leghorns, 522.	Brown Leghorns, 12.	Black Minorcas, 6.	Black Orpingtons, 96.	Buff Orpingtons, 18.	Silver Wyandottes, 90.	Langshans, 30.	
100-105	-75'04	1	—	—	—	—	—	1	—	100-105
106-110	-70'04	—	—	—	—	—	—	—	—	106-110
111-115	-65'04	—	—	—	—	—	—	—	—	111-115
116-120	-60'04	5	—	—	—	1	1	2	1	116-120
121-125	-55'04	4	3	—	—	—	—	—	—	121-125
126-130	-50'04	1	—	—	—	—	—	—	1	126-130
131-135	-45'04	4	3	—	—	—	—	1	—	131-135
136-140	-40'04	5	3	1	—	—	—	1	—	136-140
141-145	-35'04	2	2	—	—	—	—	—	—	141-145
146-150	-30'04	6	3	—	—	—	—	3	—	146-150
151-155	-25'04	9	4	—	—	2	1	1	1	151-155
156-160	-20'04	2	1	—	—	1	—	—	—	156-160
161-165	-15'04	10	5	—	—	3	1	1	—	161-165
166-170	-10'04	7	3	—	—	2	—	—	1	166-170
171-175	-5'04	4	3	—	—	—	—	1	—	171-175
176-180	Mean	9	6	—	—	2	—	1	—	176-180
181-185	+5'04	7	4	—	1	1	—	1	—	181-185
186-190	+10'04	4	3	—	—	—	—	—	—	186-190
191-195	+15'04	5	3	—	—	2	—	—	—	191-195
196-200	+20'04	8	7	—	—	1	—	—	—	196-200
201-205	+25'04	4	4	—	—	—	—	—	—	201-205
206-210	+30'04	4	2	1	—	1	—	—	—	206-210
211-215	+35'04	3	3	—	—	—	—	—	—	211-215
216-220	+40'04	8	8	—	—	—	—	—	—	216-220
221-225	+45'04	7	7	—	—	—	—	—	—	221-225
226-230	+50'04	2	2	—	—	—	—	—	—	226-230
231-235	+55'04	3	3	—	—	—	—	—	—	231-235
236-240	+60'04	3	3	—	—	—	—	—	—	236-240
241-245	+65'04	1	1	—	—	—	—	—	—	241-245
246-250	+70'04	—	—	—	—	—	—	—	—	246-250
252'16	+75'04	1	1	—	—	—	—	—	—	252'16
Mean per hen.		178'04	187'37	171'91	181'0	169'07	144'33	168'01	139'23	Mean
No. of pens below mean ...		64	40	1	—	9	1	10	3	Below
No. of pens at mean ...		2	—	—	1	—	—	1	—	At mean
No. of pens above mean ...		63	47	1	—	7	2	4	2	Above

Table II. contains the records for entire flocks and separate breeds. In this the standard deviations are worked out. These are much wider than in the English table, consequent upon the longer period of laying and the greater variations. For example, a pen of Silver Wyandottes laid only 604 eggs, or an average of 100'66, and, therefore, had an average of

77·38 eggs below the general mean, and 67·35 eggs below the breed mean. On the other hand, a pen of White Leghorns produced an average of 252·16 eggs, and were thus an average of 74·12 eggs above the general mean, and 64·79 above the breed mean.

In contradistinction to the English competitions, the White Leghorns in Australia stand easily first, both as to the number of competing birds (shown at the head of each column) and the results attained. Out of 129 pens, or 774 birds, competing, the White Leghorns were represented by 87 pens, or 522 birds. Whatever may be the cause, such as breeding and selection or climatic influences, or all these factors combined, the fact remains that 522 birds, sent in by many breeders, produced an average of nearly 190 eggs in twelve months. Were it not that these competitions are held under conditions that admit of no doubt as to their reliability, suggestions might be made as to errors, but the records may be accepted as absolute.

A further point is that the published figures reveal a remarkable maintenance of production throughout the entire year, as is shown in Table III. In order to make this clear, in addition to the actual total of eggs produced, I have worked out the index numbers, in which September, the month of highest production, is taken as 100. It should be remembered that in Australia the seasons are reversed, and that September corresponds to March in the northern hemisphere :—

TABLE III.—*Monthly Production in South Australian Laying Competition, 1910-1911.*

Month.	Total No. of Eggs Laid.	Index Numbers.
1910.		
April	6,481	41·68
May	8,819	56·72
June	8,967	57·67
July	9,558	61·47
August	13,488	86·75
September	15,548	100·00
October	15,064	96·88
November	15,034	96·69
December	14,073	90·51
1911.		
January	12,439	80·00
February	9,481	60·98
March	7,949	51·12

If British poultry-keepers could obtain in October 40 per cent. of the eggs produced in March, many of our difficulties would be solved. If that can be accomplished in Australia, why not here?

The lessons to be derived from English and Australian laying competitions are not that in the former one hen laid 103 eggs in 112 days, or that in the latter six hens produced an average of 252·16 eggs in twelve months, but that in the English contests out of entire flocks of 448 hens, 255, or more than 52 per cent., produced between 31 and 70 eggs in the sixteen weeks, and that in Australia 390 hens of all breeds of the entire flocks, numbering 774, or nearly 52 per cent., averaged between 151 and 200 eggs in the fifty-two weeks. That prizes must be awarded to the excessive layers is evident, even though it is probably true that these phenomenal layers have comparatively less influence upon general production than those which are to a lesser extent above the mean. It is, however, a question for consideration whether the pens which are nearer to that mean should not obtain the greater encouragement.

The Danish Bureau of Statistics has recently published some interesting figures, which may be read with the article on the Growth of the Co-operative Movement in Denmark published in the *Journal* for September, p. 469.

Number of
Co-operative Societies
in Denmark.

These figures are of value as indicating the comparative extent to which co-operation has been actually adopted in Denmark. These figures were obtained chiefly in connection with the live stock census of 1909, the occupiers being asked to name the co-operative societies to which they belonged.

Dairies or Creameries.—The increase in the number of co-operative dairies during the last ten years has been small, the explanation being that the existing co-operative dairies embrace so large a proportion of the cow-keeping farmers in Denmark that but little further extension is practicable. The number of estate dairies, on the other hand, has decreased, viz. :—

	1900.	1909.
Co-operative dairies	1,029	1,157
Dairies managed in common...	266	238
Estate dairies	264	90
	<u>1,559</u>	<u>1,485</u>

The census showed that there were in 1909 182,300 holdings, possessing dairy cows to the number of 1,282,300, and that no less than 93 per cent. of the holdings and 92 per cent. of the cows belonged to persons affiliated to co-operative dairies or to dairies under mutual management. The proportion of those who remained outside the co-operative organisations was found to be largest among the occupiers of farms of over 300 acres, though even on farms of from 300 to 600 acres, the milk of only 20 per cent. of the cows was dealt with direct, and on farms above 600 acres the proportion only rose to 33 per cent.

Milk Control Societies.—These societies are naturally much less widely distributed than the co-operative dairies. They number, however, 519 societies, representing 12,800 holdings and 226,000 cows. This is equal to 7 per cent. of the total holdings, and 17·7 per cent. of the cows.

Co-operative Slaughterhouses.—The number of these institutions in 1909 was 34, and approximately one-half of the holdings (carrying on pig-breeding) were affiliated to them, viz.:—

	Holdings.	Pigs.	Per cent.	
			Holdings.	Pigs.
Belonging to co-operative slaughter houses	86,484	926,220	47·6	63·9
Not belonging to co-operative slaughter-houses	95,209	522,899	52·4	36·1

Egg Export Societies.—Out of 288,000 holdings (keeping fowls), about 52,000, or 18 per cent., were affiliated to associations for the collection of eggs, and these holdings carried 3,150,000 fowls, or 27 per cent. of the total number.

Cattle Export Societies.—These associations are not very numerous, and out of 184,000 holdings with cattle only 8,400, or 4·6 per cent., were attached to a society for the export of cattle.

Co-operative Breeding Societies.—There are at present 1,884 co-operative breeding societies, i.e., societies maintaining a stallion, bull, or other breeding animal for the joint

benefit of the members. Of these societies, 270 relate to horses, 1,259 to cattle, 253 to pigs, and 102 to sheep. The number of holdings affiliated to these societies is greatest in the case of cattle, and least in the case of sheep, viz. :—

	No. of Holdings with Animals.	No. affiliated to Breeding Societies.	No. of Animals on all Holdings.	No. of Animals on Holdings affiliated to Breeding Societies.
Horses... ..	163,559	23,700	534,680	149,000
Cattle	183,562	30,300	2,243,889	536,000
Pigs	188,276	7,150	1,466,814	95,000
Sheep	95,378	900	726,026	8,000

It will be seen that approximately one-quarter of the horses and cattle of the country, and about 6 per cent. of the pigs, are kept on holdings affiliated to breeding societies.

According to the report of the Secretary of Agriculture of the United States for 1910, there are now sixty-two agricultural experiment stations in active work in that country. Fifty-five of these stations receive appropriations provided for by Acts of Congress, which amounted to £269,000 in the fiscal year 1909-10; in addition, £200,000 was contributed by the state legislatures, and £150,000 was received by the stations as fees for analyses of fertilisers, sales of farm products, and from other local sources. The total annual revenue is over £600,000, as compared with half that sum in 1905.

In 1906 the United States Congress passed the Adams Act, by which the stations were granted additional funds from the national exchequer. Under the terms of this Act the grant was to be increased annually for five years. The maximum has now been reached, and the stations received £144,000 under the Adams Act during the fiscal year 1910-11. The liberal policy of the United States Congress towards the stations has resulted in much larger appropriations by the states, and a material increase of the revenues of the stations from other sources. The Adams fund is restricted in its use to original research, and has enabled the stations to attack a large number of the difficult problems of the agriculture of the United States. The scientific work of the stations has been greatly increased in efficiency thereby. The state funds are mainly used for the more practical work, including the maintenance of sub-stations, demonstration fields, agricultural

surveys, and a great variety of local experiments, as well as for printing and disseminating the results of the experiments. By this co-operation of the national and state governments in fostering the stations, their operations have been greatly strengthened, and the results of their work have been brought more directly to the attention of farmers in every part of the United States.

The stations annually issue about 500 publications, which are regularly sent to over 900,000 addresses, mainly those of farmers. The practical results of station work are also widely disseminated through the public press. Great progress, in fact, is stated to have been made during the past decade in the direction of bringing the results of experiments home to the people whom they most concern.

Less attention has been given to the publication of the scientific work of the stations. This material has either been combined with the practical in popular publications, or issued in separate series, or published in an abbreviated form through scientific journals. Recently there has been a growing tendency to publish such material in foreign journals, in the belief that thus it is more surely brought to the attention of the scientific world. Having regard to the amount and value of the scientific work of the stations, the present method of dealing with the publication of results is not regarded as very satisfactory. It is stated that "the scientific publications of the stations are so fragmentary and scattered that it is very difficult even for workers in similar lines in the United States to obtain them in any complete way, and to the great world of science they are unknown." A proposal has been made to establish, under national authority, a central medium for the publication of original reports of this scientific work. An item for expenditure for this purpose was included in the agricultural budget of the United States.

A case lately came to the notice of the Board in which a grey lime was sold for agricultural purposes which proved on analysis to contain, in addition to 68 per cent. of lime and 1.33 per cent. of magnesia, as much as 16.6 per cent. of insoluble siliceous matter. While such a lime would be suitable for building purposes, it would be

Lime for
Agricultural
Purposes.

quite unsuitable for use on the land, as, on being wetted, it would tend to set like cement. It is doubtless unusual for lime having so large a content of silica to be sold for agricultural use, as purchasers would readily detect its unsuitability for slaking, but farmers would be well advised when buying this material to ask for a statement as to the amount of siliceous matter present. In purchasing burnt lime, quicklime, lime-shells, or caustic lime (all terms for one and the same material), a guarantee should be obtained that it contains not less than 85 per cent. of pure lime (CaO) and not more than 4 per cent. of magnesia (MgO). It may be noted in this connection that the expressions pure lime, oxide of lime, oxide of calcium or calcic oxide, sometimes made use of by sellers of lime, all have the same meaning. Ground lime consists of burnt lime ground to a fine powder, and should be similar in quality to quicklime. Ground limestone, on the other hand, is limestone rock—that is, more or less pure carbonate of lime—ground to a fine powder. When the purer limestones are used for this purpose, the percentage of carbonate of lime may be expected to exceed 95 per cent. The Board's leaflet No. 170, on *The Uses of Lime*, may be obtained free of charge and post free on application.

SUMMARY OF AGRICULTURAL EXPERIMENTS.*

SOILS AND MANURING.

The Lime in Basic Slag (*Jour. Soc. of Chem. Industry*, Vol. 30, No. 9, May 15, 1911).—In a paper by Mr. James Hendrick in the *Journal of the Society of Chemical Industry* in 1909, it was shown that there is a much smaller percentage of free lime in basic slag than is commonly represented, and that calcium carbonate is practically absent. At the same time, it was shown that there is a considerable amount of "lime available as a base," that is, lime capable of neutralising acidity in the soil and of acting as a base during nitrification. An attempt was made to measure the available base in basic slag, chiefly by distilling a solution of ammonium sulphate with the slag and estimating the basicity from the amount of ammonia given off. Ammonium sulphate was chosen on account of its being extensively used as a fertiliser. It undergoes nitrification in the soil,

* A summary of all reports on agricultural experiments and investigations recently received will be given each month. The Board are anxious to obtain for inclusion copies of reports on inquiries, whether carried out by agricultural colleges, societies, or private persons.

with the production of nitric and sulphuric acids, and in order that its action may not be harmful by rendering the soil sour these acids must be neutralised as produced. This paper describes some further experiments on the subject. It was pointed out that when dilute solutions of ammonium salts are distilled, ammonia is given off, and that consequently the ammonia given off in estimating the amount of lime available as a base in basic slag might not be due to the basic slag. By distillations of ammonium sulphate without basic slag Mr. Hendrick found that ammonia was given off, but only in an amount which, when stated as its equivalent in lime, would amount to a very small percentage of the slag. He concludes that the results in the former paper are not materially affected by the fact that ammonia is volatilised when a dilute solution of ammonium sulphate is boiled, but that these further experiments support the conclusion that there is in basic slag a considerable proportion of lime capable of acting as a base in the soil, and that a part of this lime is readily liberated. Distillation with a solution of ammonium chloride provides, however, a better method of determining the available base in slag than distillation with ammonium sulphate.

Finally, the glass of the vessels used for distillation in experiments on ammonium salts may have a very appreciable influence, especially if alkaline solutions have previously been boiled in the glass.

Effect of Heavy Nitrogenous Manuring on the Quality of the Sugar Beet (*Österr.-Ungar. Zeitschr. für Zuckerindustrie und Landw.*, 6 Heft, (1909).)—The application of large quantities of nitrogenous manures alone, e.g., nitrate of soda, sulphate of ammonia, and calcium nitrate, was shown in these experiments to increase the weight of the leaves, both fresh and dry, to a much greater extent than the weight of the roots. The leaves being of small value compared with the roots, such manuring will generally be unprofitable. The percentage sugar-content of the roots was found to be lowered, and the quality suffered since the amount of nitrogenous compounds in the roots which are detrimental in the manufacture of sugar was increased, together with the content of the roots in non-sugar substances, as a result of the increased application of nitrogenous manures. In addition, heavy nitrogenous manuring alone was found to reduce the manurial capital of the soil, especially phosphoric acid.

Continuous Growing of Crops (*Rothamsted Expt. Station, Annual Report*, 1910).—The season of 1910 proved very unfavourable for the crops at Rothamsted. The wheat, which has been grown on Broadbalk Field since 1843, produced on the unmanured plot only 7·5 bushels per acre; only on three occasions during the 67 years has it been lower. The yields all round were low, the highest being 28 bushels per acre on the dunged plot. On the plot without manure, but fallowed in alternate years, the yield was little more than 9 bushels, not much better than on the unmanured plot with wheat every year, a result which would be expected from the wet character of the winter.

The yield of barley was also poor. The most noticeable feature was the striking results produced by superphosphate, the crop on the plots without phosphoric acid being very small. This prevails generally in the experiments; phosphoric acid has its greatest effect in wet and cold seasons.

The permanent grass plots in the park also yielded much smaller crops than usual, and the proportion of the leguminous herbage was considerably below the average. The effect of lime on the half plots was not so marked as usual, though its value was very apparent to the eye on the plots on which the soil has become sour through continual applications of ammonium salts. On the limed portions of the plots the peat that had accumulated previously has almost entirely disappeared, and a close sward is beginning to form again.

Manuring of Mangolds (*Univ. Coll. of N. Wales, Bangor, Agric. Dept., Bull. ix., 1910*).—The experiment was carried out at eight centres on plots $\frac{1}{20}$ acre in size. Ten tons of farmyard manure per acre produced an increase of over 10 tons of roots per acre. Twenty tons of farmyard manure gave only a small additional increase, and either with or without artificials the extra ten tons appeared to give an insufficient return to cover the extra cost.

Manurial Experiments (*Wilts C.C. Agric. Educ. Com., Results of Field Manurial Demonstrations, 1909-10*).—A series of manurial demonstrations was arranged by the Agricultural Education Committee of the Wilts County Council in 1909-10 on very similar lines to those of the previous year. They are largely based on the scheme submitted to the Board of Agriculture by the Agricultural Education Association, and represent in each case a comparison between an unmanured plot and a number of plots manured with various artificial manures applied either singly or in combination. Tables are given showing the results obtained at each centre separately, with a full account of the soil, previous manuring, &c.

The first group related to the manuring of grass for mowing, and plots were set out at six centres. The results obtained differed very materially at each centre when compared with the unmanured plot. At one centre the same plots were used as last year, and here the difference was large, owing to the residual effect of the manures applied in the previous year.

The average result indicated an advantage from a complete dressing, and also to a lesser extent from mixtures of two manures. The direct effect obtained from the single manures was small. The quantities applied per acre, either singly or in combination, were as follows:—Kainit, $1\frac{3}{8}$ cwt.; basic slag, $2\frac{1}{8}$ cwt.; sulphate of ammonia, $\frac{7}{8}$ cwt.; superphosphate, 3 cwt.

The second group of experiments related to the manuring of mangolds. The average result showed the greatest advantage from a complete mixture of kainit, superphosphate, and nitrate of soda. Nitrate of lime appeared to be inferior either by itself or in combination to nitrate of soda. Generally the results supported the view that nitrate of soda is the most important manure for mangolds, while kainit occupies the second place. Superphosphate proved useful in combination with other manures, though its effect when used alone was insufficient on the average to cover the cost.

In the case of swedes eight plots at four centres were laid out, and the complete mixture gave the best result.

Two groups of trials at six centres were made with potatoes, the distinction being that in one group kainit was used as a source of potash, and in the other sulphate of potash. On the whole the kainit

group gave a somewhat better result than the sulphate of potash group.

In the case of wheat, the trials appeared to show that nitrate of lime was a better dressing than nitrate of soda.

FIELD CROPS.

The Best Seed of Potato Oats (*West of Scotland Agric. Coll., Bull. 56*).—It is well known that Scotch oat seeds consist of singles and doubles, a single having only a sterile rudiment in place of the extra grain of the double. In threshing, the small grains or "seconds" of the doubles are knocked away from the large grains or firsts, and so a sample of oats actually consists of singles, firsts, and seconds. The object of this experiment was to discover which of these three kinds was most productive. Four thousand seeds of each kind were sown after being tested for germinating power, on both manured and unmanured plots. Taking the yield of the singles as 100, the relative yields of dressed grain were as follows:—

	Unmanured.			Manured.		
From Singles	100	100
From Firsts	123	162
From Seconds	64	109

As regards straw, the firsts were again the most productive, and the seconds were as good as the singles. The experiment shows clearly that firsts give the heaviest yield, so that the purchaser's chief concern in buying oats for seed should be to secure the presence of large grains with no rudiment at the end of the stalk.

Varieties of Oats (*Midland Agric. and Dairy College, Repts. on Expts. with Crops and Stock, 1910-11*).—These trials have been carried out since 1905. In 1910 the varieties were tested at six centres in Lincolnshire, Nottingham, and Derby, but one proving unreliable, the following results are the averages of five centres only (all per acre):—Abundance, 50 bushels of 42 lb.; Triumph, $49\frac{1}{3}$ bush.; Propsteier, $48\frac{2}{3}$ bush.; White Horse, $47\frac{1}{3}$ bush.; Thousand Dollar, 45 bush.; Yelder, $40\frac{2}{3}$ bush. Owing to the unfavourable season the yield of the best variety was 5 bush. below that in 1909, and 20 bush. below that in 1908. Propsteier is a Swedish variety, differing from Abundance in being stronger in the straw, with larger and slightly coarser grain. In most cases it was the last of all to ripen, very luxuriant in growth, and where the crops were "laid" was the last to go down, and even then did not lie so close to the ground as the other varieties. A point against it on the English market is the rather dull white colour of grain. It gave the highest yield in 1909. A strong loam and a light loam on chalk seem equally suitable for this variety. The variety Yelder, although ripening a week sooner than the other kinds, was in most cases disappointing as regards yield. It appears to be an oat giving the maximum yield on land in a high state of fertility and in favourable seasons, conditions which did not prevail at the experimental centres.

FEEDING.

Soy Bean Meal, Cocoa-nut Cake, and Linseed Cake for Dairy Cows (*Midland Agric. and Dairy College, Repts. on Expts. with Crops and Stock*, 1910-11.—These experiments were carried out early in 1911. Soy bean meal was compared with linseed cake in a ration for cows. Eight cross-bred Shorthorn cows, weighing between 10 cwt. and 11 cwt., were selected for the trial. The daily ration consisted of 2 lb. mixed meal (bran, sharps, and dried grain), 14 lb. hay, 7 lb. chopped straw, 56 lb. mangolds, and either 5 lb. undecorticated cotton cake or $4\frac{1}{2}$ lb. linseed cake, or $4\frac{1}{2}$ lb. soy bean meal. The experiment was arranged so that four animals were fed for a fortnight on linseed cake and the succeeding fortnight on soy bean meal, while the other four animals during the month were given first soy bean meal and then linseed cake. The undecorticated cotton cake was fed to all the cows in the week before and the week after this period. The whole eight animals were thus fed for two weeks on each of the three feeding stuffs under trial. The total milk yields were: from linseed cake, 2,684 $\frac{1}{2}$ lb.; soy bean meal, 2,668 lb.; and undecorticated cotton cake, 2,625 $\frac{1}{4}$ lb. Linseed cake also gave a greater increase in live weight—35 lb. as compared with 9 lb. from soy bean meal—for the eight animals. The quality of the milk from soy bean meal was slightly superior to that from linseed cake as determined by the fat and butter tests. The manurial residue from soy bean meal was superior to that from linseed cake. On the whole, taking into consideration the higher price of linseed cake, there was little to choose between this cake and soy bean meal.

Linseed cake was also compared with cocoa-nut cake. This trial was carried out in the same way and with the same animals as the preceding investigation, the quantities of feeding stuffs given in the daily ration being 5 lb. undecorticated cotton cake, $4\frac{1}{2}$ lb. linseed cake, and 5 lb. cocoa-nut cake. The total milk yields from the eight animals fed for a fortnight on each feeding stuff were:—Linseed cake, 2,472 $\frac{1}{2}$ lb.; cocoa-nut cake, 2,429 lb.; and undecorticated cotton cake, 2,428 $\frac{3}{4}$ lb. The live weight increase was, however, greater in the case of cocoa-nut cake. The butter also from the latter cake was better flavoured and of firmer texture. The results were financially in favour of cocoa-nut cake, and this cake, at £6 15s. per ton, would appear to be well worth consideration when linseed cake is more than £9 per ton.

Analytical tests have also been made of the chemical composition of the butter from linseed cake and cocoa-nut cake. It was found that feeding with linseed cake tended to cause a diminution in the percentage of the more digestible portions of butter fat, *i.e.*, the fats giving soluble and insoluble volatile fatty acids. Feeding with cocoa-nut cake produced a butter in which the percentage of the above-mentioned digestible fats is high, especially those insoluble in water. The butter from this source also appeared to have greater keeping properties than linseed-cake butter.

DAIRYING.

Milk Records (*Lancs. C.C. Educ. Com., Agric. Dept., Farmers' Bull. No. 21*).—With a view to demonstrating the value of milk records,

the Lancashire County Council have now carried on tests for three years—in 1908 on fourteen farms, in 1909 on twelve farms, and in 1910 on twelve farms. Each herd was tested, as regards the yield and composition of the milk, once every three weeks, this having been found to give results sufficiently correct for practical purposes. The total yield for the three weeks was obtained by multiplying the yield on the day of testing by 10·5, and the estimated yield half-way between two testings by 10·5, and adding the two results. A number of points elucidated by the records obtained are discussed in this report.

Farmers generally believe that heifers yield richer milk than older cows. This is supported by the figures obtained. In the case of cows two years old the average percentage of fat was 3·71, and of total solids 12·71. These percentages decrease gradually but regularly with older cows, until with cows of seven and eight years the composition is 3·60 per cent. of fat and 12·34 per cent. of total solids. The yield, however, improves until the cows reach at least seven or eight years of age, and it would therefore appear advisable to keep the animals until they have had at least four calves.

The usual great differences were found in the capacity of individual cows. Taking the two best and the two worst cows at various ages (twelve good and twelve bad cows in all), the average yield of milk of the best cows was found to be nearly double that of the worst. It is estimated that in the case of the former, after paying for the cost of keep, a gross profit of £10 per annum per cow is left, but with the latter a loss of 3s. 8d. per cow. It may be assumed, therefore, that the smaller-yielding cows in the herds tested gave little or no profit to the owner.

The opinion is often held that the milk of high-yielding cows is poorer than that of cows with a lower yield, and that consequently when a herd is kept for butter- or cheese-making the difference noted above is largely compensated for. The records obtained showed that this was not the case. At all ages the milk of cows giving from 4,000 to 6,000 lb. per annum on the average differed little in composition from that of cows giving from 2,000 to 4,000 lb.—sometimes the percentage of solid was a little greater, sometimes a little less—and therefore, owing to the heavier yield, the former cows gave a much greater total quantity of solids.

The records of seven of the herds have now been kept for three years, and nearly all of these show a distinct improvement in yield and composition of milk, which it is considered is at any rate partly due to the help afforded by the records in eliminating unsatisfactory animals and improving the herd.

Churnability of Cream (*Jour. Roy. Agric. Soc.*, Vol. 71, 1910).—This paper contains an account of investigations carried on at the Royal Agricultural Society's Show at Liverpool, and in the Cooper Research Laboratory, with the object of finding an explanation of the peculiar variation in the churnability of creams from different breeds of cows. It has been suggested, particularly by D'Hont, that the churnability of cream depends upon the size of the fat globules present. In order to discover the predominant sizes of fat globules in different milks, microphotographs were taken, and the number of fat globules of different sizes shown in the photographs counted. In this way six

samples of milk from individual Shorthorn cows and four from Guernsey cows taken at the Liverpool Show were examined. Differences in the milks were obvious, e.g., the globules in one sample being much more uniform in size than in another. From the results which have been obtained at present, however, it is seen to be impossible to classify the different breeds in relation to their globules, for there is as much variation in the individual milks of the same breed as there is in the different breeds. With many more figures it may be possible to classify the milks from different breeds of English cattle, but it is obvious that they cannot be divided into "large," "medium," and "small" globuled milks, as has been done by D'Hont in the case of the milks obtained from some few English and foreign breeds.

A description is given of an apparatus which has been constructed for measuring accurately the churnability of cream, another for churning a number of creams at once at a fixed temperature, for the purpose of ascertaining the best temperature for churning creams from different breeds, and also a new form of tube for accurately sampling milk.

WEEDS, AND INSECT AND FUNGUS PESTS.

Destruction of Wild Radish by Nitrate of Lime (*Mitt. der Deut. Landw. Gesell., August 19th, 1911*).—A note appears in this publication on the eradication of wild radish by nitrate of lime, by Herr Ritter, of Damerow, near Rostock. The application of 30 to 35 lb. of nitrate of lime per acre was at first recommended as it was feared that larger quantities would harm the growing corn crop. Herr Ritter now suggests that 50 lb. of nitrate of lime per acre must be applied to obtain satisfactory results, this amount not causing any material damage to the cereals. The treatment is naturally beneficial when the soil is in need of nitrogenous manuring. Herr Ritter contradicts the statement that the nitrate of lime must be applied when the plants are wet with dew or rain, application of the material during dry, windy weather having given excellent results. Charlock seems to be more resistant to the treatment than wild radish.

Germination Experiments with Weed Seeds (*Jahresbericht der Vereinigung für angewandte Botanik, 1910*).—The following summary of experiments carried out at the Danish Seed Control Station at Copenhagen from 1896 to 1909 is taken from a paper read by Professor K. Dorph-Petersen, Director of the Station, at the Second International Seed Testing Congress at Münster and Wageningen in 1910.

Seeds of certain weeds were found to be capable of lying dormant in the soil for a long period before germinating. In the case of such well-known weeds as *Thlaspi arvense*, *Sinapis arvensis*, *Geranium molle*, and *Malva vulgaris*, six to twelve years often elapsed between planting and germination. The time that the seeds are kept before planting would seem to have some effect on the rapidity of germination.

The degree of ripeness of the seeds affected germination. Unripe seeds often germinated more quickly than ripe seeds, although both were obtained from the same plant. In general, however, the ripe seeds had a much higher germinating capacity, and retained their germinating capacity longer than the seeds which were less ripe.

A trial was commenced in 1899 to ascertain the length of time during which seeds of *Plantago lanceolata* and *Sinapis arvensis* will

retain their germinating capacity in the soil. For this purpose pots containing 100 seeds of each weed were placed at a depth of 12 in. below the surface of the ground. From 1900 onwards a pot was dug up each year and the seeds allowed to germinate. In the case of *Plantago lanceolata* two-thirds of the seeds were dead by 1900, but after ten years 8 per cent. still retained their germinating capacity. The germinating capacity of seeds of *Sinapis arvensis* was as high after ten years (87 per cent.) as after one year. For purposes of comparison seeds kept in dry storage since 1899 have been allowed to germinate in each year from 1900 onwards. The seeds of *Plantago lanceolata* retained their germinating capacity very well in the first few years, but by 1909 were all dead. The percentage of seeds of *Sinapis arvensis* germinating after one year was 82 per cent., and after ten years 24 per cent.

With a view to ascertaining the extent to which seeds will retain their germinating capacity when placed at different depths in the soil, pots containing seeds were placed at depths of 3 in., 8 in., and 12 in. below the surface. The trial lasted over six years, and showed that seeds placed at the greatest depth retained their germinating capacity best. The seeds of cultivated plants, especially grasses, lost their germinating capacity in the soil much more quickly than the related weed seeds. A few weed seeds, e.g., *Agrostemma Githago*, entirely lost their germinating capacity in the soil in the first year.

Weed seeds were found to retain their germinating capacity after passing through the digestive tract of a cow and pig. Of the seeds of *Plantago lanceolata* and *Matricaria inodora* fed to a cow, the number of the seeds in the manure which were found to germinate was 51 per cent. and 26 per cent. respectively of the quantities fed. About 50 per cent. of the seeds of *Rumex Acetosella* and *Chenopodium album* passed unharmed through the digestive tract of a pig. Seeds eaten by fowls were, as a rule, found to be destroyed, but in the case of these two latter weeds about 15 per cent. were unharmed.

Resemblance between Crown Gall and Nitrogen-Fixing Nodules (U.S. Dept. of Agric., Bureau of Plant Industry, Circ. 76).—Specimens of lucerne, and crimson and alsike clover, were forwarded to the Laboratory of Soil Bacteriology with a statement that although they appeared to possess the nitrogen-fixing nodules on their roots, the crop was not satisfactory. Investigation showed that these nodules, though resembling the normal nitrogen-fixing nodules, were really tumours formed by the crown gall organism. Although not apparently destructive to clover, the organism might be transmitted through this host to sugar-beet or to fruit trees.

An account of the occurrence of crown gall in England was given in this *Journal* for November, 1910, p. 617.

Prevention of Finger-and-Toe in Turnips (West of Scotland Agric. Coll., Bull. 56).—In 1902 plots in a field that was very badly infected with finger-and-toe were set aside for experiments in preventing the disease. The soil is a light loam in good condition, distinctly poor in lime. In 1903, 1904, and 1905 turnips were grown, and in 1909 swedes, the three years interval being taken up with a rotation of wheat, seeds, and oats. In all these four years the disease kept up its virulence, the crop on the untreated part of the land being almost

entirely destroyed in 1909, as well as in the three earlier years. The various dressings were applied in 1902-3. Quicklime was used in two forms, (1) slaked as soon as it was brought from the kiln by pouring water over it, and applied to the soil in autumn, and (2) slaked in the ordinary way, by being left in heaps in the field, and then spread before ploughing. Of the former kind one ton per acre had but slight effect on the disease after the first year of application, two tons was more effective, and four tons produced a marked improvement in the crop, although even this dressing was insufficient to eradicate the disease from a soil so thoroughly impregnated with it. Quicklime slaked in the natural way was distinctly inferior to the other for the first few years after application, but by 1909 there was little difference between the two. Ground lime was only equal to the less effective of the two forms of slaked lime, and was the most expensive. A dressing of 10 cwt. per acre of sulphate of copper applied along with the manures in the spring of 1903 caused for the first three years a greater failure of crop than the finger-and-toe, but in 1909 the crop on this plot was among the best in the experiment, which appeared to show that some effect had been ultimately produced. Kainit (10 cwt.) was to a certain extent beneficial, though not in the first year after application.

Potato Spraying (*National Fruit and Cider Institute, Leaflet No. 5*).—Plots were sprayed once, twice, and three times respectively with ordinary Bordeaux mixture and with "Woburn" Bordeaux mixture. The attack of disease was severe and spraying was shown to be of undoubted benefit by prolonging the period of growth. Two sprayings were more effective than one, but no conclusions could be drawn as to the relative merits of the two forms of Bordeaux mixture or the value of a third spraying, owing to some of the plots being more open to infection than others.

Spraying of Potatoes (*Univ. Coll. of N. Wales, Agric. Dept., Bull. 5, 1910*).—The spraying was carried out at nine centres in 1910, the spray consisting of 24 lb. sulphate of copper, 30 lb. pure washing soda, and 120 gallons of water per acre.

The best results were obtained from spraying twice.

HORTICULTURE, CIDER AND HOPS.

Varieties of Apples for Cider-making, and Effect of a Wet Season (*Nat. Fruit and Cider Inst. Report, 1910*).—Owing to the character of the summer of 1909, difficulty was experienced in obtaining a sufficient supply of fruit to carry on elaborate experiments, and the cider-making on a practical scale was mainly concerned with the investigation of the qualities of individual varieties. Details are given in this Report of the character of eleven varieties of sharp cider, seven of sweet, twelve of bitter-sweet, and one perry, all of which were made in bulk in the cider-house. About 150 other varieties were made on a small scale in the laboratory, and information respecting them may be obtained from the Director of the Institute.

The influence of the abnormal summer of 1909, with its lack of sunshine and excessive rainfall, was very interesting. The quality of the fresh juices in nearly every case was considerably below the average. The specific gravity was, as a rule, several points lower than the normal for the varieties concerned, and the amount of sugar was thus

seriously reduced. The acidity, on the other hand, was decidedly higher than usual, especially in the bitter-sweet varieties. The percentage of tannin generally was appreciably below the average amount, except in the sweet varieties. The rate of fermentation was almost invariably unusually rapid. The ciders themselves showed corresponding features. There was a general lack of richness and body; and although in most instances a fair average gravity was retained by means of repeated filtration, the liquor was wanting in the true fruity aroma and flavour and in body, and depended mainly upon its sweetness for its character. It was difficult to prepare satisfactory blends, since the acidity of the malic acid and the bitter astringency of the tannin stood out in striking fashion, and could not be masked sufficiently by the other elements of flavour. The manner in which the tannin flavour predominated was very marked. Other features deserving of mention were the poor keeping quality of the fruit and the rapidity with which it matured. Kingston Black apples, for example, were at the fittest state for milling towards the end of October, whereas in a normal year they do not approach that stage until the end of November or the first half of December.

Varieties of Apples, Pears, and Plums (*Worcestershire C.C. Educ. Com., Rept. on County Exptl. Garden, Droitwich, 1910*). A large number of different varieties of apples were planted from 1896 to 1898, and in this report the crops produced by each in each year from 1900 to 1910 are given. Of bush and standard trees the following are considered to have shown themselves in the first rank at this garden in producing regular and good crops of marketable fruit:—Bismarck, Bramley's Seedling, Ecklinville Seedling, Lane's Prince Albert, Lord Grosvenor, Lord Suffield, Potts' Seedling, The Queen, Worcester Pearmain, and Stirling Castle. Among sixteen half-standard trees on the crab stock, Betty Geeson, Baxter's Pearmain, Royal Jubilee, and Potts' Seedling take the foremost position. Thirty-two vertical cordon trees of different varieties were planted in 1898, and the crops for the last twelve years are given. The total from thirty-two trees in 1910 was 95½ lb., and for the twelve years 806 lb.

A large number of varieties of pear and plum trees have also been grown, and full particulars of the crop of each since 1900 are given, and in the case of plums the average price realised for fruit of each variety.

Pruning of Apples and Pears (*Worcestershire C.C. Educ. Com., Rept. on County Exptl. Garden, Droitwich, 1910*).—Twelve bush trees of Lane's Prince Albert were planted in 1899 for the purpose of testing the results of good pruning, slight pruning, and no pruning on the fruitfulness of the trees, and the quality of the fruit. The records of production since 1900 show that for some years pruning reduced the quantity of fruit considerably, though its quality was higher, but by 1909 the carefully pruned trees gave nearly the same weight of fruit as the unpruned trees, while the market value of the fruit from the former was more than twice as high as that from the latter. The same plan was adopted with pears with similar results.

Manuring of Apple and Pear Trees (*Worcestershire C.C. Educ. Com., Rept. on County Exptl. Garden, Droitwich, 1910*).—In 1899 eight bush apple trees, Lane's Prince Albert, and eight pears, Williams' Bon

Chrétien, were planted on four plots undergoing different manurial treatment. The plots were manured primarily for the vegetable crops to be grown on them, four different classes of manure being used. In other respects the treatment of the trees has been equal. The total crops produced by each pair of trees with a different manurial treatment have been as follows, for ten years ending 1910 in the case of apples and seven years ending 1910 in that of pears:—

	Apples. lb.	Pears. lb.
Garden refuse	583 (2nd quality)	121 (2nd quality)
Stable manure	734 (1st „)	367 (1st „)
Inorganic chemicals	358 (3rd „)	167 (3rd „)
Inorganic chemicals and stable manure	905 (extra fine quality)	279 (1st „)

Pruning of Gooseberries (*National Fruit and Cider Institute, Report, 1910*).—The experiments on “light” and “hard” pruning have now been brought to a conclusion on account of overcrowding by the apple and pear bushes among which the gooseberries were interplanted. The bushes were planted in 1905, and have been pruned since 1908 on the two systems, before 1908 all being pruned on the “hard” system. In the “hard” system, which is usual outside fruit-growing areas, the leading shoots are clipped back fairly hard, and the laterals still harder, so that the bush becomes round and dense. In the “light” system the leading shoots are not cut back so closely, while the laterals are more reduced than in the other system. The result is a comparatively straggling and open bush. Ease and economy of time in gathering the fruit and an improved quality of berry are the advantages claimed for the “light” system. The effect on the crop is disputed, and this experiment is intended to deal with the point. The results cover a period of three years, and the total yield in that time was 2,395 lb. from the “light” pruned bushes and 1,988 from the others. Considering the varieties separately the advantage of “light” pruning was most striking in the case of Crown Bob and Whinham’s Industry, less so with Lancashire Lad, while Keepsake gave practically equal results with the two methods. Unless considerations of space necessitate the restriction in size of the bushes, the “light” system of pruning appears to be undoubtedly preferable.

OFFICIAL NOTICES AND CIRCULARS.

The following circular letter, dated September 4th last, has been addressed to Local Authorities in Great Britain under the Diseases of Animals Acts, 1894 to 1911:—

Circular Letter

as to

Swine-Fever.

SIR,—I am directed by the Board of Agriculture and Fisheries to send to you, for submission to your Local Authority, the enclosed copy of the Interim Report of the Departmental Committee on Swine-Fever, together with copies of an Order which has been made by the Board giving effect to certain Recommendations made by the Committee. A notice requiring the publication of the Order in the District of your Local Authority is also sent herewith.

2. The Order will come into operation on the 1st prox., and carries out Recommendations Nos. (iv), (v), and (vi) of the Committee as to (a)

the compulsory keeping of registers by pig-dealers, owners of boars, and castrators; (b) the cleansing and disinfection of vehicles used for the conveyance of swine to markets; and (c) the extension of the duration of movement licences; provision is made as to cleansing and disinfection by castrators of swine, and the requirement of the conveyance of swine in a float, cart, or van while being moved with a licence (Form D) under the Swine-Fever (Regulation of Movement) Order of 1908 is dispensed with.

3. In pursuance of Recommendation No. (viii) of the Committee, arrangements have been made by the Board with H.M. Stationery Office for the placing on sale of the principal forms used in connection with the Board's Orders under the Diseases of Animals Acts. Particulars as to the forms and their prices can be obtained on application to The Controller, H.M. Stationery Office, Storey's Gate, Westminster, London, S.W.

4. With a view to give effect to Recommendations Nos. (vii) and (ix) as to the granting of licences, the interchange of declarations, and the collection of licences after use, the Board suggest that steps should be taken by Local Authorities, where this has not already been done, so that the executive duties—as distinct from professional duties falling to be performed by veterinary inspectors—in connection with the administration by Local Authorities of the Diseases of Animals Acts and Orders made by the Board thereunder should be carried out by the Police, acting as Inspectors of the Local Authority under the direction of the Chief Constable as Chief Inspector. These executive duties include, in addition to those imposed by section 43 of the Act of 1894, the service of notices, the issue of licences, the supervision of the detention of animals, and the supervision of the disposal of the carcasses of animals affected with or suspected of scheduled diseases. In the case of County Local Authorities, it is desirable that every Police Constable should be appointed as an Inspector for the purpose, at any rate, of the issue of licences for the movement of animals, in order to minimise as far as possible any inconvenience when the owners of swine have occasion to move them. The arrangements suggested would, moreover, facilitate the systematic checking of declarations, and the collection of licences after use.

5. As regards Recommendation No. (xi), I am to say that the desirability of veterinary supervision over all public sales of swine has formed the subject of communication between the Board and Local Authorities on various occasions, and it was with a view to make such veterinary supervision more effective that the Board in the Swine-Fever Order of 1894, and again in Article 15 of the Swine-Fever Order of 1908, empowered Local Authorities to make Regulations as to the entry of swine into markets and sale-yards in their Districts. The apparently negative results that have sometimes followed the veterinary supervision of swine at public sales and the cost of such supervision have, in certain instances, been urged by Local Authorities as a reason for the discontinuance of veterinary inspection in cases where for a time it had been undertaken, but the absence of disease in markets at which a veterinary surgeon attends clearly shows, in the Board's opinion, that the presence of a veterinary inspector acts as a valuable deterrent against the exposure of diseased animals, and that the object

of the inspection is thus indirectly, as well as directly, attained. The exposure of diseased swine at markets is one of the most common means by which swine-fever is disseminated, and it has frequently necessitated the declaration by the Board, in the interest of pig-owners in other districts, of a Swine-Fever Infected Area in the district served by a market at which diseased swine have been exposed. The loss and inconvenience occasioned to pig-owners by the necessary restriction on the movement and marketing of swine in an Infected Area far outweigh the expenses entailed by the veterinary examination of swine at markets. The Board have not at present considered it necessary to require the veterinary inspection of swine at all markets by Order, inasmuch as they think that arrangements for this purpose can properly be made by Local Authorities as regards their respective Districts, but the Board would urge upon every Local Authority the desirability of their giving earnest consideration to this matter. In order that veterinary inspection may be rendered effective, it is important that Regulations should be made by Local Authorities under Article 15 of the Swine-Fever Order of 1908, if this has not already been done, limiting the mode and time of entry to the principal markets or sales in their Districts, so as to secure that all swine are examined at the entrance, and before admittance to the market or sale.

6. The Board would be glad if you would be so good as to inform them in due course of the action taken by your Local Authority under paragraphs 4 and 5 of this letter.

I am, &c.,
T. H. ELLIOTT,
Secretary.

The Board of Agriculture and Fisheries have issued a new Order relating to American Gooseberry Mildew, dated September 11th, 1911, which came into operation on October 1st last, and by which the American Gooseberry Mildew Order of 1909 is revoked.

The Board of Agriculture and Fisheries withdrew as from September 25th, all the general restrictions which were imposed by them on the movement of animals in connection with the recent outbreak of Foot-and-Mouth Disease at West Hallam, Derbyshire.

**Outbreaks of
Foot-and-Mouth
Disease.**

A report of a suspected outbreak of Foot-and-Mouth Disease at Wittersham, Kent, a few miles from Udimore, where the recent serious outbreak of the disease occurred, was received by the Board of Agriculture and Fisheries on September 12th. The animals were carefully examined by a Superintending Veterinary Officer of the Board and found not to be affected with Foot-and-Mouth Disease.

The existence of Foot-and-Mouth Disease amongst dairy cows at Manor Farm, Middlezoy, near Bridgwater, Somerset, was confirmed on September 29th. Sixteen cows, out of a total of eighteen cows on the premises, were found to be affected with the disease.

The usual precautions were taken to prevent the spread of the

disease, and an Order was issued prohibiting the movement of animals in a large area surrounding the affected farm.

The Board directed the slaughter of all the diseased animals and of all others that were exposed to infection. Prior to completion of slaughter the disease was detected amongst certain contact cattle which had been pastured in a field adjoining that in which the disease first appeared.

Importation into Russia, Free of Duty, of Preparations for Combating Plant Diseases.—With reference to the note on this subject which

appeared in this *Journal* for March, 1911, p. 1031, the Board of Trade are now in receipt of a list of the preparations to be accorded duty-free admission. This list is as follows:—Sulphur, all kinds; blue copperas; iron copperas; sulphocyanate of potassium; the preparation known as “bouillie instantanée Eclairé”; “verdet excelsior”; lead arsenic (*plumbum arsenicum*); sodium arsenite; polysulphides of sodium; verdet vermored (acetate of copper); “renommée No. 1, Fama”; “renommée No. 2, Soufrée”; “bouillie bordelaise Schlösing”; “bouillie U. U. Gimel” (Unique usage); oxychlorate of calcium; bisulphide of calcium; paper for rings required for covering up trunks of trees; formalin.

Permission to import the above-mentioned preparations duty-free from abroad will be granted, without presentation of special vouchers from the Department of Agriculture, to all Government institutions engaged in the destruction of pests noxious to agriculture. Such institutions are to accept all responsibility for the proper use of these preparations.

Permission will also be given to “Zemstvos,” agricultural societies, and—as regards preparations capable of being used solely for the destruction of pests noxious to agriculture and for no other technical purposes—also to private firms, upon presentation in every case by such “Zemstvos,” agricultural societies, and private firms of a special voucher from the Department of Agriculture or persons duly authorised by the Department which shall exercise supervision over the application of the preparations specified. (*Board of Trade Journal*, August 31st, 1911.)

Importation of Live Stock into Ireland.—The Board of Agriculture and Fisheries have been informed by the Department of Agriculture and Technical Instruction for Ireland that in consequence of the confirmation by the Board on the 29th ult. of the existence of Foot-and-Mouth Disease at Middlezoy, near Bridgwater, Somerset, the Department have again prohibited, for the time being, all importations into Ireland from Great Britain of cattle, sheep, goats, or other ruminating animals, or swine. Equine animals do not come within the scope of this prohibition, and, consequently, horses, asses, or mules may still be imported into Ireland from Great Britain if accompanied on each occasion by the necessary permit from the Department in Ireland.

Importation of Potatoes into South Africa.—The Board of Agriculture and Fisheries desire to give publicity to the new regulations issued by the Government of the Union of South Africa, whereby potatoes will be admitted from any part of the British Isles, provided that each

consignment is accompanied by a declaration from the consignor stating where the potatoes were grown, and also a certificate from the Board of Agriculture and Fisheries declaring that so far as they are aware no outbreak of Wart Disease (Black Scab) of potatoes has occurred within a radius of five miles from the locality where the potatoes were grown.

Applicants for the Board's certificate must forward a declaration signed by the grower of the potatoes stating where the potatoes were grown, and giving the name of the parish and county in which the farm is situated. The grower must also declare that no case of Wart Disease has occurred on his premises.

International Exhibition at Ghent in 1913.—H.M. Consul-General at Antwerp reports that active preparations are already being made for an International Exhibition, which is to be held at Ghent in 1913. Ghent is a world-renowned horticultural and agricultural centre, and H.M. Consul-General strongly recommends British firms to exhibit in the horticultural and agricultural sections, as the machinery and tools commonly in use in Belgium are not of the excellence of those produced in the United Kingdom.

Agricultural Exhibition Abroad.

The weather during the *first* week (August 27th to September 2nd) was fair to fine over Great Britain on the whole, but in Scotland rain fell rather frequently. Temperature was "very unusual" in England E., the excess above the average amounting to more than 5°, and elsewhere the temperature was classed as "unusual." Rainfall was more than the average in Scotland N. and W., but less elsewhere; in England E. the fall was less than 0·1 in. "Abundant" or "very abundant" sunshine was recorded in all districts, the excess above the normal being very uniform.

Notes on the Weather in September.

In the *second* week the conditions were again fine and dry over the country generally. Warmth continued "unusual" or "very unusual," the excess over the average temperature being very large in most parts of England. Rainfall was generally slight, the fall over England amounting to less than 0·1 in.; a moderate rainfall was experienced in Scotland E. and N. Bright sunshine continued "abundant" or "very abundant" except in Scotland N., where it was slightly below the normal.

The conditions varied over the country in the *third* week. Temperatures were much lower and differed little from the average over a considerable portion of Great Britain; in the three districts, England E., S.E., and S.W., warmth continued "unusual" however. Rainfall was unequally distributed, but was considerably above the average only in northern England and the English Channel; in Scotland there was a large deficiency. Abundant sunshine still continued to be experienced in most districts, but in Scotland E. and W. and England N.E. and N.W. it had dropped to "moderate."

During the *fourth* week the weather was fine and dry in nearly all

districts until about the middle of the week, when a decided change in the conditions took place. Over the whole week temperature was below the average in all districts, a condition which had not prevailed since the closing week of June. Rainfall was in excess of the average in all districts excepting Scotland E. and W.—largely so in England S.W. and the English Channel. As a general rule bright sunshine was “abundant” in the eastern parts of the country and “scanty” in the western districts.

During the *fifth* week the conditions were very unsettled, and almost every part of Great Britain experienced frequent rain, the falls being heavy in many localities. There were, however, considerable intervals of fair to bright weather. On the whole, temperature differed little from the normal, but was below it in Scotland and above it over the greater portion of England. Rainfall differed greatly in amount in the various districts. The fall in England S.W. was “light,” in Scotland E. and W., England S.E., and the Midlands it was “moderate,” and in Scotland N., England N.E., E., and N.W. it was “heavy.” Bright sunshine exceeded the average, the excess being large in several districts.

The preliminary statement of the Agricultural Returns collected in June last shows a further reduction, by 51,272 acres, of the cultivated area of Great Britain, arable land having decreased by 20,786 acres and permanent pasture by 30,486 acres. The acreage of wheat increased by 97,189 acres, and reached a total of 1,906,043 acres, being a larger area than has been recorded in any year since 1899. The acreage of barley, on the other hand, declined by

**Area under Crops
and Number of
Live Stock, 1911.**

decreased by 20,786 acres and permanent pasture by 30,486 acres. The acreage of wheat increased by 97,189 acres, and reached a total

LIVE STOCK.

	No.	No.	No.	Per Cent.	No.	Per Cent.
Horses used for Agricultural purposes (includ. Mares for Breeding)	1,087,054	1,136,915	—	—	49,861	4'4
Unbroken horses { One year and above ...	272,674	282,281	—	—	9,607	3'4
(includ. Stallions) { Under one year ...	120,847	126,180	—	—	5,333	4'2
TOTAL	1,480,575	1,545,376	—	—	64,801	4'2
Other Horses	146,818	—	—	—	—	—
TOTAL OF HORSES	1,627,393	—	—	—	—	—
Cows and { In Milk... ..	2,229,115	2,225,109	4,006	0'2	—	—
Heifers { In Calf, but not in Milk	595,934	542,509	53,425	0'8	—	—
Other Cattle :—Two years & above	1,394,045	1,353,195	40,850	3'0	—	—
„ „ One year & under two	1,485,959	1,519,562	—	—	33,603	2'2
„ „ Under one year ...	1,409,211	1,396,952	12,259	0'9	—	—
TOTAL OF CATTLE	7,114,264	7,037,327	76,937	1'1	—	—
Ewes kept for breeding	10,443,488	10,665,644	—	—	222,156	2'1
Other Sheep :—One year & above	5,500,874	5,487,317	13,557	0'2	—	—
„ „ Under one year ...	10,550,630	10,949,984	—	—	399,354	3'6
TOTAL OF SHEEP	26,494,992	27,102,945	—	—	607,953	2'2
Sows kept for Breeding	397,789	331,478	66,311	20'0	—	—
Other Pigs	2,424,365	2,018,468	405,897	20'1	—	—
TOTAL OF PIGS... ..	2,822,154	2,349,946	472,208	20'1	—	—

130,734 acres, and reached a smaller total than any yet recorded. There was practically no change in the acreage of oats, but the acreage of beans recovered the loss shown in last year's returns. The potato area increased by 6 per cent. (32,330 acres), and thus nearly reached the total recorded in 1909. Mangolds also have slightly extended, but other roots show a somewhat diminished acreage. There is some

PRELIMINARY STATEMENT for 1911, compiled from the Returns collected on the 5th June; and comparison with 1910.

CROPS.

DISTRIBUTION.	1911.	1910.	INCREASE.		DECREASE.	
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Per Cent.</i>	<i>Acres.</i>	<i>Per Cent.</i>
TOTAL AREA (excluding WATER)	56,214,419	56,214,419	—	—	—	—
TOTAL ACREAGE under all CROPS and GRASS (a)	32,094,658	32,145,930	—	—	51,272	0'2
ARABLE LAND	14,648,104	14,668,890	—	—	20,786	0'1
PERMANENT GRASS (a) { For Hay Not for Hay...	5,002,764	5,004,943	—	—	2,179	0'0
	12,443,790	12,472,097	—	—	28,307	0'2
	TOTAL... 17,446,554	17,477,040	—	—	30,486	0'2
Wheat	1,906,043	1,808,854	97,189	5'4	—	—
Barley (including Bere)	1,597,947	1,728,681	—	—	130,734	7'6
Oats	3,010,649	3,020,974	—	—	10,325	0'3
Rye	46,374	46,249	—	—	1,875	3'9
Beans	311,833	270,042	41,791	15'5	—	—
Peas	167,917	168,728	—	—	811	0'5
Buckwheat	5,751	4,997	754	15'1	—	—
Potatoes	572,014	539,684	32,330	6'0	—	—
Turnips and Swedes	1,563,246	1,595,345	—	—	2,099	0'1
Mangolds	452,250	442,779	9,471	2'1	—	—
Cabbage	65,179	61,929	3,250	5'2	—	—
Kohl-Rabi	13,330	14,880	—	—	1,550	10'4
Rape	78,573	81,722	—	—	3,149	3'9
Vetches or Tares	110,544	104,604	5,940	5'7	—	—
Lucerne	53,140	58,505	—	—	5,365	0'2
Carrots	11,248	10,724	524	4'9	—	—
Onions... ..	4,221	4,038	183	4'5	—	—
Flax	449	229	220	90'1	—	—
Hops	33,056	32,886	170	0'5	—	—
Small Fruit	84,304	84,309	—	—	5	0'0
CLOVER and ROTATION GRASSES { For Hay Not for Hay...	2,074,879	2,074,579	300	0'0	—	—
	2,045,245	2,082,458	—	—	37,213	1'8
	TOTAL... 4,120,124	4,157,037	—	—	36,913	0'9
OTHER CROPS	110,509	105,684	4,825	4'6	—	—
BARE FALLOW	329,403	354,010	—	—	24,607	7'9
ORCHARDS (b)	250,669	250,673	—	—	4	0'0

(a) Excluding Mountain and Heath Land used for grazing (12,875,660 acres in 1911).

(b) Any Crop or Grass grown in Orchards is also returned under its proper heading.

indication of a revival of the cultivation of flax, which forty years ago occupied about 20,000 acres, but in recent years has almost disappeared. The acreage of hops also for the second successive year shows a slight extension, though it is still nearly 12,000 acres less than it was so recently as 1907. The acreage under fruit, which for several years up to 1909 had increased annually, now remains stationary.

The returns of horses on agricultural holdings have been collected this year in fuller detail than heretofore. In addition to horses used for

agricultural purposes, mares kept for breeding and unbroken horses, a return has been obtained for the first time of other horses kept on farms. The number of these is returned as 146,818, but it is probable that in previous years some now returned under this heading may have been erroneously included in the returns. The reduction shown in the classes for which a comparison is possible is therefore in all probability less than the figures indicate. The number of cattle returned on June 5th was 76,937 more than in 1910, the total now being the largest on record. The number of sheep declined by 607,953, and thus fell lower than in any year since 1907. On the other hand, pigs increased by no less than 20 per cent., the total number being restored to the same level as in 1908.

The reports furnished by the Crop Reporters of the Board on the agricultural conditions on October 1st show that such corn as was still outstanding at the end of August had all been harvested during the past month, mostly within the first week, and that only in the extreme north of Scotland was any remaining to be secured.

**Crop Conditions
in Great Britain
on October 1st.**

Potatoes were not suited by the weather of September, and a small deterioration is to be noted. Some progress has been made with lifting in most districts, and the tubers generally prove to be small. Second growth is common, but, on the other hand, the crop is generally very free from disease. The yield, in Great Britain as a whole, is expected to be about 96 per cent. of an average crop.

Roots have suffered badly during the month, particularly turnips and swedes. The rains at the end of August encouraged hopes that turnips and swedes would improve, but the subsequent hot drought in the first fortnight of September proved disastrous, and the more suitable weather in the latter half had no effect in retrieving the situation. A very few good crops are reported from parts of Wales and western Scotland, but elsewhere even average crops are exceedingly scarce, and by far the greater number of the reports describe them as very bad and mildewed. Mangolds have done better than turnips and swedes, and bad yields are not nearly so universal; still, the crop generally is much below normal. Representing an average yield by 100, the appearance of the roots on October 1st indicated yields for Great Britain which may be represented by the following percentages: turnips and swedes, 78; mangolds, 91.

The early harvest of 1911 has allowed good progress to be made with autumn cultivation on all light soils; but heavier lands, in the absence of sufficient rain, remained in many districts too hard for working. Fair breadths of wheat had already been sown in various districts throughout England, even as far north as Durham, although this work was perhaps more backward in the east.

"Seeds" are not at all satisfactory, except in some districts in the north of England. Many fields have practically perished during the drought, and most others are thin and patchy. In many localities seeds have been ploughed up, and the land planted with mustard and other catch crops, especially in the west and south-west.

Pastures have generally remained very bare, and live stock cannot be regarded as being in good condition, except where artificial foods have been given. This has been frequently necessary, and, failing it, stock have, as a rule, done badly.

The *Bulletin of Agricultural Statistics* for September, 1911, issued by the International Institute of Agriculture, shows the production of the cereal crops this year from information received up to September 20th. The countries for which it is possible to give an approximate estimate of the production are as follows:—

In Europe: Prussia, Belgium, Denmark, Spain, France, Great Britain, Ireland, Hungary (including Croatia and Slavonia), Italy, Luxemburg, Netherlands, Roumania, Russia in Europe (63 governments), Switzerland; in America: Canada and United States; in Asia: India, Japan, Russia in Asia (10 governments); in Africa: Algeria (Departments of Alger and Oran), Tunis.

The inclusion of France and Russia this month has materially modified the figure showing the relative total production this year as compared with last year, and with the exception of wheat the yield of the cereal crops is not expected to reach last year's output.

Wheat.—The total area under wheat in all the countries named exceeds that of 1910 by 3·5 per cent. The production of wheat in France is estimated at 40,006,000 qr., as compared with 31,593,000 qr. last year. In Russia-in-Europe the yield is expected to be 69,272,000 qr., or 8·77 bush. per acre, as compared with 11·15 bush. per acre last year.

For Russia-in-Asia the estimated yield is 9,928,000 qr., or 7·88 bush. per acre, compared with 9·07 bush. per acre in 1910. The production this year is larger than last year's in Spain, France, United Kingdom, Hungary, Italy, Canada, and India, and is smaller than last year's in Prussia, Roumania, Russia, and the United States. The total production for all the countries included this month is 381,009,000 qr., as compared with 379,253,000 qr. in 1910, or an excess of 0·5 per cent.

Rye.—The production of rye in France is estimated to be 5,612,000 qr., an increase of 460,000 qr. as compared with last year. In Russia-in-Europe the yield is expected to be 91,610,000 qr., or 10·41 bush. per acre, against 11·45 bush. last year. The total production of rye in all the countries specified (excluding Great Britain, Canada, India, Japan, Algeria, and Tunis) is 159,183,000 qr., as compared with 165,173,000 qr. last year, or a decrease of 3·6 per cent. The area planted is greater than that of 1910 by 1·9 per cent.

Barley.—The yield of barley in Russia-in-Europe is anticipated to reach 51,085,000 qr., or an average production per acre of 14·63 bush., as compared with 15·70 bush. in 1910. The total production in all the countries named above (excluding France and India), is estimated to be 135,305,000 qr., as against 136,027,000 qr. last year, or a decline of 0·5 per cent. The area planted is almost equal to that of 1910.

Oats.—The production of oats in Russia-in-Europe is anticipated to be 86,554,000 qr., or a yield per acre of 16·24 bush., as compared

with 18'53 in 1910. The total production in all the countries named above (excluding France, India, and Tunis), is estimated to be 309,206,000 qr., as compared with 347,675,000 qr. last year, or a considerable decrease of 11'1 per cent. The area planted slightly exceeds that of last year, being 0'6 per cent. greater.

The following supplementary notes are given:—

Germany.—The cereal harvest is ended. The condition of oats on September 1st was 3'0, as compared with 2'9 on August 1st of this year, and 2'7 on August 15th, 1910 (1=excellent, 5=very bad).

Belgium.—The continued dry weather was propitious for harvesting operations, which were carried out under excellent conditions.

Ireland.—The cereal harvest, which was from a fortnight to three weeks earlier than usual, was almost completed by September 11th. All the cereals will be under average in yield. The quality of the grain will be good, especially barley, which is described as plump and of good bushel weight. Oats will be small in the grain owing to lack of sufficient moisture at filling time.

Norway.—The harvest is finished. The conditions of the crop (expressed on the Institute's scale where 100=condition promising an average yield) were on September 1st as follows:—Wheat and rye, 100; barley, 95; oats, 90.

Sweden.—In the midlands the drought lasted until the end of August. Harvesting was done under most favourable circumstances throughout the country, and the crop has been secured in excellent condition. The yield of straw is very poor in comparison with the output of grain. The estimated production of the cereal crops expressed in a percentage of the average production of the past ten years is, for wheat, 115; rye, 106; barley, 113; oats, 103.

Egypt.—The area of wheat in 1911 is 1,284,000 acres, with an estimated yield of 4,754,000 qr., and the area of barley 384,000 acres, with a production of 1,433,000 qr.

Chile.—The areas under wheat and barley are respectively 1,482,000 acres and 741,000 acres, being in each case an increase of 10 per cent. over the area sown to these two crops in 1910-11. The condition of the crops on September 1st was good, promising a yield 20 per cent. above the average of the past ten years. Weather conditions are favourable.

Austria.—A report of the Austrian Ministry of Agriculture, referring to the middle of September, gives the condition of the crops as follows:—Wheat, 2'8; rye, 2'8; barley, 2'4; oats, 2'7; maize, 3'3; potatoes, 3'4; sugar-beet 4'2 (1=very good, 2=above average; 3=average; 4=below average; 5=very poor).

Argentina.—The weather continues favourable for the growing crops, and present prospects are reported to be all that could be desired. The preliminary official estimate of the area sown is:—Wheat, 17,030,000 acres, as compared with 15,445,000 acres in 1910; and oats, 2,445,000 acres, as against 1,900,000 acres last year. An average yield per acre on this year's area would give a crop of about 24 million

quarters, against 17,500,000 quarters last year. (*Beerbohm's Evening Corn Trade List*, September 29th, 1911.)

Canada.—From a bulletin compiled by the Census and Statistics Office at Ottawa, dated September 14th, the average yield of spring wheat is estimated at 19'14 bush. per acre in the Dominion, which is seven bushels more than last year. The production of fall wheat, which is grown almost wholly in Ontario and Alberta, was expected to be 17,706,000 bush. The total wheat yield of the country is estimated to be 204,634,000 bush., or 82 million bushels more than the estimate at the same date last year. The yield per acre is 19'50 bush. For the Dominion the yield of oats is given as 368,100,000 bush., which is 84,900,000 bush. more than last year's estimate at the same date, and the average of 36 bush. per acre exceeds last year's average by 7 bush. The average for barley is also higher than last year by 7 bush. per acre, and the total yield is estimated at 51,559,000 bush., as against 40 million bush. in 1910. (*Dornbusch*, September 27th, 1911.)

United States.—The Crop Reporting Board of the Department of Agriculture estimates the yield of all wheat as 655,189,000 bush.; as compared with 695,443,000 bush. in 1910 and 737,189,000 bush. in 1909; of the 1911 crop, 454,821,000 bush. are winter wheat and 200,367,000 bush. spring wheat, as compared with 464,044,000 bush. and 231,399,000 bush. respectively in 1910. The yield of oats is given as 874,200,000 bush., as compared with 1,126,765 bush. in 1910 and 1,007,353,000 bush. in 1909. The yield of maize is given as 2,759,340,000 bush., as compared with 3,125,713,000 bush. in 1910 and 2,767,316,000 bush. in 1909. The yield of barley is given as 20'7 bush. per acre in 1911, 22'4 bush. last year, and 24'3 bush. in 1909; the quality is returned at 84'9 per cent., as against 69'8 last year. (*Corn Trade News*, October 9th, 1911.)

France.—The yield of barley in 1911 is returned as 5,913,000 qr., as compared with 5,267,000 qr. in 1910, and of oats as 36,880,000 qr., as compared with 35,224,000 qr. last year. (*Journal Officiel*, October 1st, 1911.)

Beet-root Crop in Russia.—H.M. Ambassador at St. Petersburg states, on the 6th ult., that the total area under sugar-beet cultivation was about 1,957,000 acres, an increase of nearly 290,000 acres over last year. Some 151,000 acres had been affected by adverse weather conditions, damage by insects, and failure from bad seed. It was estimated in the middle of July that of the total acreage planted 1,009,000 acres, or about 51 per cent., were in good condition, and 698,000 acres, or 36 per cent., were in fair condition, the rest, 13 per cent., being in an unsatisfactory or bad state. A later dispatch states that the yield will be nearly 13 million tons, as against 10,850,000 tons last year.

Hops.—From reports received through the Foreign Office, it appears that the yield of hops in *Bavaria* is much smaller than last year, and is estimated to be about 94,000 cwt., as compared with 218,000 cwt. in 1910, the average yield being only about 2½ cwt. per acre, against nearly 5 cwt. last year. The quality is said to be excellent. In *Bohemia* it is estimated that the production will be

123,000 cwt., as compared with 225,000 cwt. in 1910. It is not expected that the exports of hops from Bohemia will be considerable, as the produce will be required for home consumption. In *Belgium*, the crop is estimated at 45,000 or 50,000 cwt., as against 65,000 cwt. in 1910.

Messrs. John Barth and Son, of Nuremberg, in their report on the hop crop and prices, dated September 25th, estimate the world's production of hops in 1911 at 1,307,000 cwt., as compared with 1,532,900 cwt. in 1910, and 909,000 cwt. in 1909. They estimate the yields in the principal countries as follows:—Germany, 219,000 cwt.; Austria-Hungary, 175,000 cwt.; France, Belgium, Holland, and Russia, 156,000 cwt.; United States, 394,000 cwt.; and England, 348,000 cwt. They regard the world's crop as quite a normal yield, and only about 225,000 cwt. below last year's output. The growth has been excellent, both as regards quality and colour.

Potato Crops on the Continent.—From reports received through the Foreign Office, it appears that the yield of potatoes in *Bavaria* will be smaller than last year, and will, for the most part, be required for human consumption. In *Alsace-Lorraine* the crop is not expected to reach half the usual yield, though the quality is expected to be good. The chief potato-growing area in Germany, which lies in the neighbourhood of *Posen*, promises only a poor yield in comparison with the average, but the prospects in the districts along the coast of the Baltic are very fair. In *Wurtemberg* the latest estimate published by the Imperial Statistical Bureau gives an estimate under the average. The crop is healthy but small. For *Germany* as a whole the condition of potatoes at the beginning of September is given as 3·5 (3=average, 4=small). On heavy soils the crop has, in spite of the drought, maintained a comparatively good condition, but on the light soils potatoes have suffered badly. The tubers, especially the late sorts, are small, and have commenced to grow out. The estimated production for *Prussia* is 22,205,000 tons, as against 32,204,000 in 1910.

In *Holland* the crop of "table potatoes" has, on the whole, stood the drought well, and is very free from disease. On the clay soils large quantities of excellent quality have been produced, so that in Friesland the crop is very good. On sandy soils the effect of the dry weather was more marked. It is expected that the export will be very small owing to home requirements. The crop of "factory potatoes" has not done so well, and the yield is not expected to be more than one-quarter of a normal crop. The total area is given as 74,920 acres for "factory" and 330,460 for "table" potatoes.

In *Belgium*, the crop is estimated as 3,365,000 tons, as against 2,804,000 tons last year.

France.—In the districts of Havre, Caen, Trèport and Eu, Honfleur and Fécamp, the yield is generally expected to be superior to that of last year. The tubers are generally small, but healthy.

From other districts reports are as follows:—Ille and Vilaine and Manche, about an average crop; district round Rouen, less than 1910; Côtes du Nord and Mayenne, very good and sound crop; Morbihan and Loire, much smaller than in 1910; Pas de Calais, scanty crop, quality excellent; Nord, favourable on good soil, very poor on sandy soil, quality excellent.

Hungary.—From reports furnished to the Hungarian Minister of

Agriculture, up to September 19th, the yield of potatoes is estimated to be 3,855,000 tons. Potatoes have suffered from the prolonged drought, and the probable yield is expected to be considerably below that of last year.

The following statement shows that, according to the information in the possession of the Board on October 1st, 1911, certain diseases of animals existed in the countries specified:—

Prevalence of Animal Diseases on the Continent.

Austria (week ending September 20th).

Anthrax, Blackleg, Foot-and-Mouth Disease (10,952 Höfe), Glanders and Farcy.

Belgium (sixteen days ending August 31st).

Anthrax, Blackleg, Rabies, Foot-and-Mouth Disease (3,801 "foyers" in 612 "communes").

Bulgaria (week ending September 6th).

Anthrax, Glanders and Farcy, Rabies, Sheep-pox, Swine-fever, Foot-and-Mouth Disease, Tuberculosis.

Denmark (month of July).

Anthrax, Foot-and-Mouth Disease (1 case).

France (month of August).

Blackleg, Glanders and Farcy, Rabies, Sheep-pox, Sheep-scab.

Foot-and-Mouth Disease (33,966 "étables" in 3,217 "Communes").

Germany (on September 21st).

Glanders and Farcy, Swine-fever, Foot-and-Mouth Disease (37,180 infected places in 5,113 parishes).

Holland (month of August).

Anthrax, Foot-rot, Sheep-scab, Swine Erysipelas, Foot-and-Mouth Disease (15,503 outbreaks in 11 provinces).

Hungary (week ending September 13th).

Anthrax, Glanders and Farcy, Rabies, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (61,345 "cours").

Italy (week ending August 6th).

Anthrax, Glanders and Farcy, Rabies, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (251 cases entailing 18,827 animals).

Montenegro (seventeen days ending June 16th).

Foot-and-Mouth Disease (329 "étables" infected in 17 "communes").

Norway (month of August).

Anthrax, Blackleg.

Roumania (nine days ending September 13th).

Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine-fever, Sheep Scab, Foot-and-Mouth Disease.

Russia (month of May).

Anthrax, Cattle-plague, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine-fever, Foot-and-Mouth Disease (233,160 cases in 2,847 "communes").

Servia (eight days ending September 9th).

Rabies, Sheep-pox, Swine-fever, Foot-and-Mouth Disease (1,779 cases in 11 "arrondissements").

Spain (month of July).

Anthrax, Blackleg, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Foot-and-Mouth Disease (15,764 animals), Pleuro-pneumonia, Tuberculosis.

Sweden (month of August).

Anthrax, Blackleg, Swine-fever, Swine Erysipelas.

Switzerland (week ending September 24th).

Anthrax, Blackleg, Swine Erysipelas, Foot-and-Mouth Disease (314 "étables" and 105 "alpages-Pâturages" entailing 11,731 animals, of which 83 "étables" and 7 "alpages-pâturages" were declared during the week).

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand

Agricultural Labour for agricultural labour in September:—

in England

during September.

Farm work generally proceeded without interruption from bad weather in September, but, owing to the forward state of work, the demand for labourers outside the regular farm staff was considerably reduced in many districts, and a large number of such extra labourers were out of employment during some part of the month.

Northern Counties.—Farm work was generally in a forward condition, on account of the early completion of the corn harvest, and the demand for extra labourers was somewhat reduced in consequence. A surplus of such men was reported in several districts in *Yorkshire*, but in other districts in these counties the supply was about equal to the demand. The principal kinds of work for which extra men were wanted in September were, apart from completing the corn harvest, thatching stacks, threshing, carting, and spreading manure, taking up potatoes, trimming hedges, and cleaning out watercourses.

Midland Counties.—Extra labourers were, on the whole, in excess of the demand in these counties, there being little or no hoeing to be done on the root crops, which had suffered much from the dry weather. In certain districts, however, these men obtained fairly regular employment at such work as threshing, carting manure, hedging, and ditching.

Eastern Counties.—There was a fair demand for extra labourers in these counties for threshing, potato-lifting, manure carting, hedging, &c., and the supply of such men was generally taken up. Some surplus, however, was reported in several districts, including the Erpingham, Smallburgh, and Swaffham Rural Districts in *Norfolk*, and the Braintree Rural District in *Essex*. In the Rochford Rural District in *Essex* some scarcity of extra men was reported.

Southern and South-Western Counties.—According to the reports received, there was a fair demand for extra labourers in *Kent*, *Wiltshire*, and *Cornwall*; but in the other counties the drought caused a smaller demand, and a certain amount of irregular employment.

THE CORN MARKETS IN SEPTEMBER.

C. KAINS-JACKSON.

Not for many years has September been marked by such brisk and sustained business as has distinguished the past month. The harvest had made great progress by the end of August, even in the north, and the first twelve days of September being remarkably fine with a very dry atmosphere, threshings proceeded with unaccustomed rapidity. The demand for the new crops was greatly stimulated by the fine quality shown, and the only drawback is that the new cereal year has begun by a heavy draft on home production which is likely to make home-grown grain more than usually scarce after Lady Day next year. The tendency to sell new crops early does not in any way diminish, but it is not put down exclusively to the needs of farmers for cash after harvest. Prices for the second half of the cereal year show, on an average of five-and-twenty seasons, no such clear advance over the first half as would demonstrate the wisdom of holding corn back.

Wheat.—The new wheat of home growth is remarkable for its hardness and fitness for immediate milling, which in the eastern parts of England excites less attention than in the west, where in three years out of four samples on the summer side of Martinmas are not usable without a large admixture of dry old wheat, whether home-grown or imported. The new English wheat this season is often capable of "creating" a lofty loaf without aid from any Manitoba, Saxonka, or strong Argentine, but the most experienced millers prefer, even in this exceptional year, a certain percentage of wheat from abroad.

The prices quoted at most markets have been about 35s. for white and 34s. for red per 504 lb., which weight is attained pretty generally. Few samples fall below 496 lb., and it is said that there is "next to no tail corn." This, of course, is a vague term, but it is an index to opinion as regards both the fine quality of 1911 wheat and the perfect condition in which it was secured. Dominion wheat at the close of the month was about 40s. on spot, with a large forward business done for October shipment at 37s. per 480 lb. This gives the seller up to 31st to ship. The sorts of imported wheat on which most business has passed have been Indian at 35s. to 36s., and Australian at 37s. to 38s. per qr. The Russian wheat crop of 1911 is put at a total so markedly less than that of last year that holders of 1910 corn have been increasing in firmness of attitude all through the month. They asked on the 30th 38s. to 39s. per 492 lb. Little has been done in other foreign sorts of wheat on spot, but the Pacific seaboard of the U.S. is busy shipping new wheat at a 37s. per 500 lb. level.

September shipments were 1,303,000 qr. from North America; 520,000 qr. from South America; 417,000 qr. from India; 917,000 qr. from Russia; 1,421,000 qr. from Europe S.E.; and 425,000 qr. from Australasia. The large exports from the countries grouped as Europe S.E. were the feature of the wheat shipments of September. There were on the 30th 2,100,000 qr. on passage of all sorts, which is about the same total as a year ago. September imports were not excessive in themselves, but, taken together with the unusually large deliveries of British wheat, they raised the total wheat supply to a figure in excess of requirements for current consumption.

Flour.—The Bakers' Exhibition at Islington was remarkable for a very large competition in "Standard," or 80 per cent. bread, and also for a very extensive display of a number of patent loaves and cakes in which the percentage of the rougher grists was considerable. Some clue to public consumption of different forms of flour is to be found in the rise in prices for the less finely ground. These used to range from 1s. to 5s. below the price of Town Households, but the best now exceed Town Households in price. The top-price of London flour has fallen 1s. on the month, from 33s. to 32s., but other sorts for cash are not more than a net 6d. down as a rule. The credit and delivery prices have eased at Mark Lane and elsewhere—not at Mark Lane only—about 1s. on the month. American flour has been dull, while Canadian for future shipment and Australian on spot have favoured buyers. There were 546,000 sacks shipped by America, including Canada, during the month, and 222,000 sacks, a fair average quantity, were on passage on the 30th.

Barley.—Popular judgment at Mark Lane, Norwich, Lynn, Bury St. Edmunds, Ipswich, Reading, Newbury, Canterbury, and many other markets affirms that this is the best barley year for quality within living memory. This can hardly be brought to proof, but the opinion is worth recording. The great brewing firms have been extremely active, and the quantities of new barley sold during September were probably unprecedented. The new barley is believed by brewers to be likely to keep uncommonly well, and this naturally adds to their readiness to buy promptly. About 40s. is paid for good 448 lb. samples, and a most gratifying feature of the year is the large number of farmers who have hardly grown for the maltster, but find themselves with something to submit to him. This, however, diminishes the offerings of home-grown barley to the buyers for feed, and all sorts of grinding grain are dearer on the month. Nothing, either home-grown or from Russia, is to be had under 24s. per 400 lb., or 6s. per cential. Shipments of the month were 4,360,000 qr. from Russia and 555,000 qr. from Europe S.E. The Russian total is unique, but is due to eagerness of buyers, who insisted on early shipment. The crop itself in Russia is regarded as a good average without being anything extraordinary. On the 30th over 600,000 qr. of barley were on passage to Great Britain.

Oats.—Excellent quality marks the new oats, in which a good trade has passed. They are so dry that they can safely be fed to horses at once. The price for 336 lb. averages about a guinea, and is remarkably uniform throughout England. In North Britain 22s. to 22s. 6d. is demanded, and oatmeal, instead of falling in price as is the September custom, has advanced 1s. per cwt. in some cases, and 6d. generally. Common oats from Russia and Argentina have been held for 18s. to 18s. 6d. per 304 lb., a price which has checked business. Shipments for September were 132,000 qr. from Canada; 200,000 qr. from Argentina; 738,000 qr. from Russia; and 150,000 qr. from Europe S.E. Non-shippers are the U.S., Scandinavia, and Australasia. The supply on passage on 30th was 270,000 qr.

Maize.—The demand has rather exceeded the supply, and as on the 30th only 180,000 qr. were on passage continued dearth seems for some time ahead to be all but inevitable. The new crops are ripe

by early October in the United States, Russia, and South-Eastern Europe, and are regarded as an average in the last two regions. In the United States the expectations are rather pessimistic. Maize does best in a sunny and dry climate, but is said to fail badly where these elements are overdone, and the recent summer in the United States is believed by many experts to have overtaxed the plant. Trustworthy estimates will hardly be forthcoming before the cobs have been dried. September shipments were 204,000 qr. from North America, 458,000 qr. from Russia, and 569,000 qr. from Europe S.E. The prices ruling at the close of the month were not much below 30s. at the ports, while inland exchanges sometimes quoted 4s. per bushel.

Oilseeds.—Appreciation for use as an oilseed is attaching to the sunflower, and two or three small cargoes have been placed at 10s. per cwt. On the ordinary markets 14s. to 15s. per cwt. is paid, but even at the latter price the fattening value of the oil is such as to make the staple come out well on comparative analysis with linseed. That article is as dear as ever; 70s. to 80s. per qr. is its range, and 9s. 6d. per cwt. is charged for London-made linseed cake even to large cash buyers ex mill. There were on the 30th 146,000 qr. of linseed and 22,000 tons of cottonseed on passage. The linseed shipments of September were 244,000 qr. from Argentina, and 269,000 qr. from India. There is no very immediate promise of oilseeds becoming at all cheap.

Various.—Owing to good quality and a good seeding demand, rye and tares are dearer on the month. Beet-sugar has been an excited market, but German new crop is offered for November shipment at 1s. per cwt. under spot values, and as the time taken in transit is almost a negligible quantity, the inducement to wait till November is naturally restrictive of spot business. Rice is dearer on the month, and the prices telegraphed on the 30th from Bombay and Rangoon did not appear to admit of a profit margin on export, either of the fine types associated with the former or of the feeding rice usually named in connection with the latter port.

THE LIVE AND DEAD MEAT TRADE IN SEPTEMBER.

A. T. MATTHEWS.

Fat Cattle.—There being no general change in the weather conditions, the difficulties of graziers during September were even greater than before, and complaints of the scarcity of well-finished bullocks were common in nearly all markets, while the number of half-meated animals on offer was large. The result was a sharp run on the few prime cattle coming forward, and a dull trade for the rougher sorts. The very large supply at Islington on the 25th of over 1,800 head was very significant of the state of things in the country. Of this number less than 100 could be described as prime, and if we deduct another hundred of very poor animals, the remaining 1,600 were in good store condition only, just suitable for finishing in the stalls. With a few rare exceptions this case doubtless reflects the aspect of other markets, and the fact that under such circumstances prices should have gradu-

ally hardened, points to the existence of a healthy demand and the probability of enhanced values in the near future.

Shorthorns, in about twenty of the leading English markets, averaged 8s. 3d., 7s. 5d., and 6s. 4½d., against 8s., 7s. 3½d., and 6s. 3d. in August; Herefords, 8s. 5½d. and 7s. 9d., against 8s. 4½d. and 7s. 7d.; Devons, 8s. 3½d. and 7s. 6d., against 8s. 2d. and 7s. 4½d.; Welsh Runts, 8s. 1½d. and 7s. 5d., against 7s. 9d. and 7s. 3½d.; Polled Scots, 8s. 4½d. and 7s. 9d., against 8s. 3½d. and 8s. per stone. At Ipswich some really good, stall-fed Shorthorns have been shown, and keenly competed for, selling freely at 9s. 6d., and some at nearly 10s. per stone. This is more than 1d. per lb. above the average of other markets, and shows the results of good feeding.

Veal Calves.—There was no special feature in the fat calf trade. The best were less plentiful, and averaged 8½d. per lb., and second quality a fraction over 7d., but there is a large proportion of very low quality sold at little more than nominal prices.

Fat Sheep.—The position of the flock owner cannot be said to have improved during the past month, for not only is there present scarcity of keep, but the winter prospects are very bad in most districts. Strong lambs and sheep in poor condition have been forced on the market, and thus prevented any advance in prices which, on striking the average of markets, are found to have almost exactly maintained their August level. The best Downs certainly show a fractional improvement, but it is less than a farthing per lb., the averages being:—Downs, 7½d., 6½d., and 5½d., and Longwools, 6½d., 6d., and 4½d. per lb. for the three qualities. In the last week there was an advance at Norwich, where first quality Downs fetched 8½d. per lb. The only British market exceeding this for any breed was Glasgow, and even there the choicest Cross-breds only touched 8½d. As some guide to future probabilities of market movements, it may be well to remember that before this time, in moderate seasons, the lambs (or tegs as they may now be called) would all have been on turnips, and making progress in winter feeding, but, speaking broadly, there are no early turnips this year, and the swedes are badly blighted. It is therefore difficult to see how farmers can fatten anything like the usual number. This means that many of these young sheep are being sold now instead of next April, thus mortgaging the future supplies and keeping down present values.

Fat Lambs.—The season for English lamb may now be said to be over, but lambs were separately quoted till the last week in the official returns. For the first two weeks they averaged 8½d. and 7½d. per lb., but declined ¼d. in the third week.

Fat Pigs.—The changes in the value of bacon pigs were very slight, but such as they were they were the turn in favour of sellers. The averages in British markets were 6s. 5½d. per 14 lb. stone for small, and 5s. 10½d. for larger pigs.

Carcass Beef—British.—Supplies of Scotch beef have been very moderate, and the London demand was steady. Short sides averaged from 6½d. to 7d. per lb., and long sides 6½d. to 6½d. English beef was only represented by second quality, which fetched 5½d., and cow beef, which ranged from 4½d. to 5½d. per lb. The month finished with a bad trade.

Port-Killed Beef.—Supplies at Deptford were not very large, and

this beef sold relatively well, fetching an average of $5\frac{3}{4}d.$ to $6\frac{1}{4}d.$ per lb., with a decline of $\frac{1}{2}d.$ per lb. in the last week.

Chilled Beef.—There was a small quantity of States chilled during the first half of the month, and the best hindquarters fetched up to $7d.$ per lb., and forequarters $4d.$, but none afterwards came to hand. The trade in Argentine chilled still feels the effects of the strike. A very large quantity was frozen hard to preserve it, and this is now being gradually sold at about $1d.$ per lb. less than that now arriving. Hindquarters coming fresh to hand have appreciated in value, and for the last two weeks the best have been making $5d.$ per lb. The best fores have touched $3d.$ against $2\frac{1}{4}d.$ in August.

Frozen Beef.—Frozen beef was a quiet trade and steady in value, the best hinds selling at an average of $4d.$ per lb. and fores $2\frac{3}{4}d.$

Carcass Mutton—Fresh-Killed.—The mutton trade was very slow, and at times much depressed. Very large supplies of sheep and lambs came from Scotland, also from Holland and the west of England, and sales were often forced at extremely low rates. The best Scotch never exceeded $6\frac{3}{4}d.$ per lb., and good English sold at $5\frac{1}{2}d.$ Dutch being of similar value.

Carcass Lamb.—No British lamb fetched more than $7d.$ per lb., and the best New Zealand was generally worth $5\frac{1}{2}d.$, Australian $5d.$, and Argentine rather less.

Frozen Mutton.—The best New Zealand mutton sold steadily at $4\frac{1}{4}d.$ per lb., and Australian at $3\frac{3}{4}d.$, fluctuations in value being very trifling.

Veal.—Good veal was scarce in London, and in the third week both English and Dutch of choice quality fetched up to $9d.$ per lb., but suddenly returned to $8d.$ in the last week.

Pork.—During the colder weather there was a good demand, and with a small supply in the third week good English went up to $7d.$, but the average for the month was from $5\frac{1}{2}d.$ to $6d.$, according to size and quality.

THE PROVISION TRADE IN SEPTEMBER.

HEDLEY STEVENS.

Bacon.—As anticipated in my last review, prices have steadily declined, more especially on all American cuts, and in some cases the drop has been as much as $7s.$ to $8s.$ per cwt. This has been brought about for the most part by the consignments of American meats, which were delayed on account of the dock strike, and got out of condition, necessitating the acceptance of low prices to effect a clearance. Three auction sales were held in Liverpool to assist in the quick disposal of these goods. Arrivals from all countries have been larger during the month, and this has, of course, had the effect of lowering prices.

Values in America have also declined, there having been a continued increase in the number of hogs marketed, and consequently lower prices for the raw material. Packers must now have fair stocks on hand, so that we may anticipate still lower prices in that country and in Canada. Prices for American hogs are now well under those current at the same time last year, the range during the month of

September being \$5.80 to \$7.70, against \$8.15 to \$10.00 last year, and \$7.25 to \$8.55 two years ago.

English pigs are much cheaper than at the same time last year, and, with feeding stuffs so dear, many breeders are reducing their holdings.

Cheese.—On account of the continued dry weather both here and in Canada and consequent shortage in the make of cheese, prices have continued to advance. Sales made during August at figures which looked extremely high have turned out good purchases, as from 5s. to 7s. per cwt. advance has since been paid for September makes, sales having been made at as high as 73s. c.i.f., which is about 20s. per cwt. over the value of similar goods at the same time last year.

The stock of cheese in Canada is now estimated to be about 150,000 boxes less than last year. The total shipments from that country have been about 65,000 in excess of last year, importers finding that the increased demand for Canadian to replace the shortage in English cheese necessitated the early use of the summer makes, instead of storing them for the winter trade.

The advance in prices on spot during the month has been from 4s. to 5s. per cwt., which makes values about 16s. to 17s. above those current at the same time last year. Up to the present there have been no signs of the higher prices curtailing consumption, but grocers are at present working on their cheaper purchases, and when the full advance is asked the effect is sure to be a falling off in the demand. Further contracts have been made for regular deliveries of the new season's New Zealand cheese, as high as 66s. c.i.f. having been paid.

At the end of the month the stocks of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) were 269,000 cheese, against 363,000 at the same time last year, and 325,000 two years ago. The stock of New Zealand cheese was 250 crates in London and Bristol, against 1,150 last year.

English cheese has been in good demand at hardening prices, on account of the continued short make.

Butter.—High prices have been the feature of the month's trading, and with imports continuing below the normal, it is anticipated that values will show further advances during October. The spot value of Colonial butter at the end of the month was higher than at any previous time in the month of September.

Cable advices from both Australia and New Zealand report favourable conditions for a large make of dairy products.

Moderate shipments continue to arrive from Canada, total shipments to September 16th being 69,000 packages in excess of last year. This has been chiefly brought about by the much smaller quantities of raw cream shipped into the United States of America during the present season.

Eggs.—A fair trade has passed, the demand being chiefly for best fresh lots, at hardening prices.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND
in the Month of September, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	ENGLAND.		SCOTLAND.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per cwt.†	per cwt.†
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	8 5	7 10	39 8	36 1
Herefords	8 6	7 9	—	—
Shorthorns	8 3	7 5	38 4	35 2
Devons	8 4	7 6	—	—
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	8½	7½	8½	6½
Sheep:—				
Downs	7½	6½	—	—
Longwools	7	6½	—	—
Cheviots	7¾	7	7½	6½
Blackfaced	7½	6¾	7	6½
Cross-breds	7½	6½	7¾	6½
	per stone.*	per stone.*	per stone.*	per stone.*
	s. d.	s. d.	s. d.	s. d.
Pigs:—				
Bacon Pigs	6 6	6 0	6 3	5 7
Porkers	7 0	6 6	6 8	5 11
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	22 1	18 1	22 10	17 13
„ —Calvers... ..	22 4	18 0	20 0	16 13
Other Breeds—In Milk ...	18 15	16 12	19 18	16 6
„ —Calvers	15 5	12 15	19 4	16 7
Calves for Rearing	2 1	1 11	2 6	1 10
Store Cattle:—				
Shorthorns—Yearlings ...	8 19	7 7	10 18	8 14
„ —Two-year-olds... ..	12 15	11 11	14 3	12 5
„ —Three-year-olds ...	16 18	14 11	16 5	14 0
Polled Scots—Two-year-olds	—	—	15 19	13 8
Herefords— „	—	13 10	—	—
Devons— „	13 0	11 0	—	—
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	26 8	20 11	—	—
Scotch Cross-breds ...	—	—	24 7	20 2
Store Pigs:—				
8 to 10 weeks old	16 5	12 9	16 11	15 0
12 to 16 weeks old	24 8	18 10	26 6	23 6

* Estimated carcass weight.

† Live weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in
ENGLAND and SCOTLAND in the Month of September, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.		Quality.	Birming- ham.	Liver- pool.	Lon- don.	Man- chester.	Edin- burgh.	Glas- gow.
			per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
			s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BEEF :—								
English	...	1st	55 6	56 0	57 0	52 6	56 0*	56 6*
		2nd	49 6	52 0	53 6	50 0	51 0*	53 0*
Cow and Bull	...	1st	46 6	46 0	46 0	46 0	46 0	46 6
		2nd	40 0	40 0	41 0	42 0	38 0	42 0
U.S.A. and Cana- dian :—								
Port Killed	...	1st	—	55 6	58 0	53 6	—	53 0
		2nd	—	51 6	54 0	51 6	—	50 6
Argentine Frozen—								
Hind Quarters...		1st	34 6	35 0	36 0	35 0	35 6	35 0
Fore „ „		1st	25 0	25 0	25 0	25 0	25 6	25 0
Argentine Chilled—								
Hind Quarters...		1st	43 6	41 6	44 0	41 6	43 6	43 0
Fore „ „		1st	27 6	27 0	25 6	27 0	27 0	27 0
Australian Frozen—								
Hind Quarters...		1st	33 0	32 6	36 0	32 6	—	32 0
Fore „ „		1st	24 6	23 6	25 0	23 6	—	23 6
VEAL :—								
British	...	1st	65 6	67 0	77 0	65 6	—	65 6
		2nd	56 0	60 0	66 6	59 6	—	—
Foreign	...	1st	—	—	77 0	—	74 6	—
MUTTON :—								
Scotch	...	1st	—	66 0	61 0	65 6	62 6	66 0
		2nd	—	61 0	59 0	62 0	55 0	51 6
English	...	1st	59 6	60 6	55 0	63 0	—	—
		2nd	56 0	56 0	51 6	58 6	—	—
Argentine Frozen	...	1st	35 0	34 6	33 6	34 6	35 6	34 6
Australian „	...	1st	32 6	33 0	34 6	33 0	—	33 0
New Zealand „	...	1st	—	—	39 6	—	—	—
LAMB :—								
British	...	1st	—	64 6	65 6	65 6	64 6	65 6
		2nd	59 6	55 6	60 6	58 6	53 0	49 0
New Zealand	...	1st	53 6	50 0	50 6	50 6	—	51 6
Australian „	...	1st	—	45 6	46 6	—	—	39 6
Argentine „	...	1st	43 0	45 0	42 0	44 6	—	40 0
PORK :—								
British	...	1st	62 6	62 0	59 6	62 0	56 0	56 0
		2nd	56 0	57 0	54 0	56 6	50 0	53 0
Foreign	...	1st	—	—	57 0	—	—	—

* Scotch.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1909, 1910 and 1911.

Weeks ended (<i>in</i> 1911).	WHEAT.						BARLEY.						OATS.					
	1909.		1910.		1911.		1909.		1910.		1911.		1909.		1910.		1911.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 7 ...	32	9	33	6	30	5	26	11	24	11	23	11	17	5	17	2	17	0
" 14 ...	32	8	33	8	30	8	27	1	24	11	23	10	17	5	17	7	17	2
" 21 ...	33	2	33	9	30	11	27	3	24	11	24	5	17	8	17	6	17	4
" 28 ...	33	0	33	6	30	11	27	6	25	0	24	4	17	9	17	4	17	3
Feb. 4 ...	33	4	33	7	30	9	27	7	24	10	24	5	17	10	17	7	17	5
" 11 ...	33	8	33	4	30	5	27	8	24	9	24	6	17	11	17	11	17	5
" 18 ...	34	1	33	0	30	3	27	11	24	6	24	7	18	0	18	0	17	6
" 25 ...	34	5	32	7	30	2	28	0	24	2	24	9	18	0	17	10	17	7
Mar. 4 ...	34	10	32	7	30	0	27	11	24	6	25	0	18	2	18	1	17	5
" 11 ...	35	8	32	6	30	1	28	4	24	1	25	0	18	2	18	0	17	5
" 18 ...	35	9	32	6	30	1	28	0	23	6	24	11	18	5	18	0	17	6
" 25 ...	36	0	32	9	30	2	28	0	23	7	25	0	18	6	17	11	17	5
Apl. 1 ...	36	5	33	0	30	3	27	10	23	8	24	11	18	8	18	0	17	5
" 8 ...	37	4	33	6	30	4	28	0	23	1	24	7	18	10	17	11	17	7
" 15 ...	38	7	33	7	30	3	27	8	23	5	25	2	19	2	18	3	18	3
" 22 ...	41	4	33	7	30	4	28	2	23	0	25	5	19	9	18	3	17	10
" 29 ...	42	5	33	0	30	11	27	10	22	10	25	5	20	0	18	3	18	3
May 6 ...	40	9	32	6	31	4	27	7	22	7	25	7	20	3	18	2	18	6
" 13 ...	41	6	32	1	31	8	27	3	22	0	25	1	20	6	18	1	19	0
" 20 ...	42	8	31	10	32	6	27	0	21	8	25	4	20	11	17	8	19	2
" 27 ...	42	6	31	3	32	8	26	3	21	4	25	0	21	0	17	10	19	5
June 3 ...	43	1	30	2	32	5	25	7	21	8	24	10	21	3	17	10	19	5
" 10 ...	42	11	29	1	32	4	26	10	20	9	25	7	21	4	17	10	19	7
" 17 ...	42	7	29	0	32	3	26	10	18	11	23	11	21	6	18	0	19	8
" 24 ...	42	8	29	4	31	11	27	2	20	1	23	9	21	7	17	9	19	10
July 1 ...	42	9	29	9	31	10	27	2	19	11	24	5	21	9	17	7	19	9
" 8 ...	43	0	30	4	32	1	26	4	19	5	25	10	21	8	17	4	19	9
" 15 ...	43	3	31	1	32	3	26	10	21	3	25	10	21	9	17	7	19	11
" 22 ...	44	0	31	11	32	5	27	4	19	9	24	3	22	5	17	5	19	5
" 29 ...	43	5	33	5	32	5	24	6	20	10	23	8	22	2	18	1	19	7
Aug. 5 ...	44	9	33	9	32	0	27	4	20	5	24	4	22	11	18	3	18	2
" 12 ...	44	9	33	5	31	6	24	9	20	4	26	9	21	8	18	0	18	0
" 19 ...	41	6	32	11	31	6	23	11	20	11	27	8	19	8	17	11	17	10
" 26 ...	38	5	32	7	31	8	24	7	20	10	28	10	19	4	17	2	18	0
Sept. 2 ...	37	2	32	2	31	7	26	3	22	10	28	4	19	6	17	2	18	3
" 9 ...	34	11	31	11	31	10	26	1	23	3	28	4	18	5	17	2	18	1
" 16 ...	33	6	30	11	32	0	26	5	24	3	29	0	17	9	16	6	18	5
" 23 ...	32	9	30	2	32	4	26	8	24	2	29	11	17	7	16	3	18	9
" 30 ...	32	2	30	1	32	6	26	9	24	4	30	5	17	2	16	4	19	1
Oct. 7 ...	31	8	30	1	32	7	26	9	24	7	30	9	17	0	16	3	19	5
" 14 ...	31	4	30	2			27	0	25	1			17	0	16	2		
" 21 ...	31	8	30	4			27	7	25	3			16	11	16	1		
" 28 ...	31	10	30	4			27	9	25	4			17	0	16	2		
Nov. 4 ...	32	5	30	4			27	9	25	6			17	0	16	2		
" 11 ...	32	5	29	11			27	7	25	4			17	1	15	11		
" 18 ...	32	7	29	8			27	0	25	1			17	4	16	1		
" 25 ...	33	0	29	11			26	8	24	10			17	3	16	4		
Dec. 2 ...	33	3	30	6			26	1	24	7			17	4	16	7		
" 9 ...	33	3	30	9			25	7	24	3			17	3	16	9		
" 16 ...	33	2	30	7			25	3	23	9			17	4	16	10		
" 23 ...	33	1	30	7			25	2	23	10			17	4	16	9		
" 30 ...	33	3	30	5			25	1	23	9			17	4	16	9		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 30 lb. per Imperial Bushel.

AVERAGE PRICES of Wheat, Barley, and Oats per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and Breslau.

	WHEAT.		BARLEY.		OATS.	
	1910.	1911.	1910.	1911.	1910.	1911.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
France : August	45 8	42 4	25 4	26 4	21 3	21 9
September	46 1	42 8	25 5	26 11	21 1	21 8
Paris : August	48 10	43 4	23 11	26 3	22 1	22 11
September	48 10	43 6	24 8	27 0	21 8	22 10
Belgium : July	33 10	34 3	22 4	24 2	20 2	21 7
August	34 6	33 8	22 1	25 4	20 0	20 10
Germany : July	41 11	43 4	24 3	27 1	20 11	25 1
August	41 7	42 4	24 5	30 6	20 3	23 1
Berlin : July	45 4	45 8	—	—	21 0	23 2
August	42 6	43 6	—	—	21 3	23 7
Breslau : July	40 11	41 6	— *	— *	19 8	22 11
August	38 4	39 7	22 11†	24 9†		
			— *	29 10*	20 3	22 11
			22 11†	24 9†		

* Brewing.

† Other.

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of September, 1910 and 1911.

	WHEAT.		BARLEY.		OATS.	
	1910.	1911.	1910.	1911.	1910.	1911.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
London... ..	32 10	33 3	24 7	29 7	17 5	20 0
Norwich	31 0	31 8	25 1	28 8	16 2	18 2
Peterborough	30 1	31 7	23 9	30 6	16 1	18 6
Lincoln... ..	30 10	32 0	22 9	29 9	17 4	18 8
Doncaster	32 4	32 0	22 4	27 9	17 10	18 3
Salisbury	30 9	31 5	22 1	27 8	17 0	18 3

AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND and SCOTLAND in the Month of September, 1911.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Bristol.		Liverpool.		London.		Glasgow.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British ...	16 0	15 0	—	—	15 9	14 0	16 0	15 0
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery	127 6	123 6	126 6	123 0	128 0	124 0	123 6	—
„ Factory	114 0	108 6	113 0	105 6	113 6	110 0	—	—
Danish ...	—	—	135 6	133 0	134 6	132 0	131 6	127 0
French ...	—	—	—	—	135 0	131 0	—	—
Russian ...	119 6	116 6	119 6	115 6	121 0	118 6	118 6	115 6
Canadian ...	128 6	122 6	125 0	122 0	—	—	126 0	122 0
Australian ...	122 0	118 0	—	—	125 0	121 6	—	—
CHEESE :—								
British—								
Cheddar ...	77 6	71 6	77 6	75 0	82 0	75 0	72 0	70 0
			120 lb.	120 lb.	120 lb.	120 lb.		
Cheshire ...	—	—	77 0	72 0	84 0	72 6	—	—
			per cwt.	per cwt.	per cwt.	per cwt.		
Canadian ...	69 0	67 6	69 0	67 0	69 6	68 6	70 0	68 6
BACON :—								
Irish ...	73 6	69 6	71 6	67 0	74 0	70 0	71 0	68 0
Canadian ...	64 6	62 6	64 0	60 0	65 6	63 0	—	—
HAMS :—								
Cumberland ...	—	—	—	—	108 0	100 0	—	—
Irish ...	—	—	—	—	108 6	105 0	117 6	112 0
American								
(long cut)	69 6	67 0	66 6	62 6	73 0	70 6	66 6	63 6
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British ...	12 8	11 3	—	—	14 4	12 8	—	—
Irish ...	11 2	10 6	11 4	10 4	11 7	10 0	11 4	10 5
Danish ...	11 4	10 7	11 6	10 3	11 6	10 0	11 7	11 1
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
British Queen	87 6	71 0	55 0	50 0	87 6	80 0	—	—
Edward VII.	88 6	77 6	56 6	51 6	85 0	77 6	—	—
Up-to-Date ...	82 0	75 0	51 6	46 6	90 0	83 6	73 6	—
HAY :—								
Clover ...	103 6	92 6	105 0	82 6	119 6	97 0	80 6	75 0
Meadow ...	95 0	81 0	—	—	112 0	90 0	—	—

DISEASES OF ANIMALS ACTS, 1894 to 1910.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	SEPTEMBER.		NINE MONTHS ENDED SEPTEMBER.	
	1911.	1910.	1911.	1910.
Swine-Fever:—				
Outbreaks	184	119	1,921	1,090
Swine Slaughtered as diseased or exposed to infection ...	2,090	1,152	22,347	9,864
Anthrax:—				
Outbreaks*	87	101	648	1,081
Animals attacked	99	103	803	1,289
Foot-and-Mouth Disease:—				
Outbreaks	1	—	9	2
Animals attacked	16	—	441	15
Glanders (including Farcy):—				
Outbreaks	27	40	152	288
Animals attacked	64	99	367	861
Sheep-Scab:—				
Outbreaks	5	15	311	350

* For 1910 the figures show the outbreaks reported, but for 1911 the outbreaks confirmed.

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	SEPTEMBER.		NINE MONTHS ENDED SEPTEMBER.	
	1911.	1910.	1911.	1910.
Swine-Fever:—				
Outbreaks	14	2	104	73
Swine Slaughtered as diseased or exposed to infection ...	190	15	1,765	1,708
Anthrax:—				
Outbreaks	—	—	7	5
Animals attacked	2	—	14	8
Glanders (including Farcy):—				
Outbreaks	—	—	2	1
Animals attacked	—	—	3	2
Sheep-Scab:—				
Outbreaks	12	16	265	364

ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library. A list of these publications appeared in the *Journal* for October, November, and December, 1909.]

Agriculture, General and Miscellaneous—

- Kronacher, Dr. C.*—Bilder von einer landwirtschaftl. Gesellschaftsreise durch England und Schottland. (164 pp.) Hanover : M. and H. Schaper, 1911. [A. 2; A. 12.]
- Duggar, B. M.*—Plant Physiology with Special Reference to Plant Production. (516 pp.) New York : The Macmillan Co., 1911. 7s. net. [B. 16-3; B. 17.]
- King, F. H.*—The Soil. Its Nature, Relations, and Fundamental Principles of Management. (303 pp.) New York : The Macmillan Co., 1909. 6s. 6d. net. [B. 40-1.]
- Deutsche Landwirtschafts-Gesellschaft.*—Arbeiten. Heft. 192 :—Betriebsverhältnisse der deutschen Landwirtschaft. Stück XIV. (85 pp.) Berlin : Paul Parey, 1911. [A. 28.]
- Iowa Agricultural Experiment Station.*—Research Bull. No. 1 :—The Chemical Nature of the Organic Nitrogen in the Soil. (46 pp.) Ames, Iowa, 1911. [B. 40-9.]
- Texas Agricultural Experiment Stations.*—Bull. No. 138 :—Co-operative Fertilizer Experiments with Corn, Cotton, Rice, Cauliflower, Peanuts, Onions, Tomatoes, and Potatoes, 1908-9-10. (71 pp.) [B. 46.] Bull. No. 139 :—Electrolysis of Humus Solutions. An Improved Method for the Estimation of Humus. (15 pp.) Brazos County, Texas, 1911. [B. 40-9.]
- U.S. Dept. of Agriculture.*—Farmers' Bull. No. 454 :—A Successful New York Farm. (32 pp.) [A. 80.] Farmers' Bull. No. 460 :—Frames as a Factor in Truck Growing. (29 pp.) [B. 8-3.] Washington, 1911.
- U.S. Dept. of Agriculture, Bureau of Plant Industry.*—Bull. No. 215 :—Agriculture in the Central Part of the Semiarid Portion of the Great Plains. (43 pp.) Washington, 1911. [A. 80; B. 56-1.]
- U.S. Dept. of Agriculture, Bureau of Chemistry.*—Circ. No. 74 :—Detection and Determination of Small Quantities of Ethyl and Methyl Alcohol and of Formic Acid. (8 pp.) Washington, 1911. [B. 22-5.]
- Wisconsin Agricultural Experiment Station.*—Bull. No. 208 :—Crop Demonstrations on State and County Farms. (30 pp.) Madison, Wisconsin, 1911. [A. 80; B. 46.]
- Georgia Experiment Station.*—Bull. No. 81 :—The Effect of Carbonates upon Nitrification. (42 pp.) Experiment, Georgia, 1908. [B. 40-9.]
- Russell, E. J., and Golding, J.*—Sewage Sickness in Soil, and its Amelioration by Partial Sterilisation. (16 pp.) [Reprinted from the Journal of the Society of Chemical Industry, April 29th, 1911.] [B. 24-7; B. 40-1.]
- Bengal, Dept. of Agriculture.*—Recommendations for the Work of the Department in Assisting the Agricultural Shows of Bengal. (87 pp. + plates.) Calcutta : Bengal Secretariat Press, 1911. [A. 60.]
- Michigan Agricultural Experiment Station.*—Circ. No. 11 :—Lime for Agricultural Purposes. (4 pp.) East Lansing, Mich., 1911. [B. 24-5.]
- Memoirs of the Geological Survey, Scotland.*—The Geology of Colonsay and Oronsay, with Part of the Ross of Mull. (109 pp.) London : E. Stanford, 1911. 2s. 3d. [B. 36.]

First Report of the Proceedings of the Development Commissioners for the Period from 12th May, 1910, to the 31st March, 1911. (H. C., 199-1911.) (60 pp.) London: Wyman and Sons, 1911. 3d. [A. 2-1.]

Royal Commission on Sewage Disposal.—Seventh Report. Vol. II.—Appendices.—Part I.:—Minutes of Evidence and Reports to the Commission in reference to Growths of Green Sea-weeds in Sewage Polluted Estuaries. [Cd. 5543.] (145 pp. + maps.) London: Wyman and Sons, 1911. 2s. 2d. [B. 24-7.]

Board of Trade.—Report upon the Conditions and Prospects of British Trade in Syria. [Cd. 5707.] (215 pp. + map.) London: Wyman and Sons, 1911. 2s. [A. 62.]

Field Crops—

"*Home Counties*" (J. W. Robertson-Scott).—Sugar Beet: Some Facts and Some Illusions: A Study in Rural Therapeutics. (424 pp.) London: Horace Cox, 1911. 6s. net. [C. 34-1; C. 34-5.] [This book deals with sugar-beet cultivation with special reference to the possibility of its successful commercial cultivation in the United Kingdom.]

Texas Agricultural Experiment Station.—Bull. No. 137:—Alfalfa in Northwest Texas. (17 pp.) Brazos County, Texas, 1911. [C. 44-3.]

Maine Agricultural Experiment Station.—Bull. No. 183:—Experiments in Breeding Sweet Corn. (249-316 pp. + 8 plates.) Orono, Maine, 1911. [C. 20; B. 17.]

U.S. Dept. of Agriculture.—Farmers' Bull. No. 455:—Red Clover. (48 pp.) [C. 42-3.] Farmers' Bull. No. 458:—The Best Two Sweet Sorghums for Forage. (23 pp.) [C. 34-9.] Washington, 1911.

U.S. Dept. of Agriculture, Bureau of Chemistry.—Bull. No. 138:—Translocation of Plant Food and Elaboration of Organic Plant Material in Wheat Seedlings. (32 pp.) Washington, 1911. [C. 2-1.]

Wisconsin Agricultural Experiment Station.—Bull. No. 206:—Tobacco Culture in Wisconsin. (30 pp.) [C. 54.] Bull. No. 212:—Barley Culture in Wisconsin. (17 pp.) [C. 8.] Madison, Wisconsin, 1911.

Kansas Agricultural Experiment Station.—Bull. No. 175:—Grasses. (292-394 pp.) Manhattan, Kansas, 1911. [C. 42-1.]

Washington Agricultural Experiment Station.—Bull. No. 99:—Field Pea Production in Washington. (23 pp.) [C. 36.] Bull. No. 100:—Wheat and Flour Investigations. I. Analyses and Tests of Crops of 1908 and 1909. II. The Composition and Milling Quality of Washington Wheats. III. A Simple Apparatus for Determining the Milling Qualities of Wheats. (52 pp.) [C. 2-1.] Pullman, Washington, 1911.

Georgia Experiment Station.—Bull. No. 93:—Corn Production. (143-154 pp.) Experiment, Georgia, 1911. [C. 20.]

Canada, Central Experimental Farm.—Bull. No. 67:—Growing and Using Mangels, Sugar Mangels, and Forage Sugar Beets, with Notes on their Chemical Composition. (20 pp.) Ottawa, 1911. [C. 32; C. 34-3.]

Smetham, A.—The Dietetic Value of the so-called Standard Bread. (22 pp.) [Reprinted from the Journal of the Royal Lancashire Agricultural Society for 1911.] [C. 6.]

Commonwealth of Pennsylvania, Dept. of Agriculture.—Bull. No. 190:—The Potato: Selection of Seed and Cultivation. (61 pp.) Harrisburg, Pennsylvania, 1910. [C. 26-3.]

Live Stock—

Barton, F. T.—Horses and Practical Horsekeeping. (643 pp.) London: Jarrold and Sons, n.d. 10s. 6d. net. [F. 64-1.]

Canada, Dept. of Agriculture, Branch of Live Stock Commissioner.—Bull. No. 14:—Horse Breeding and Rearing of Colts. (15 pp.) Ottawa, 1911. [F. 64-1.]

North Carolina Agricultural Experiment Station.—Bull. No. 213 :—Feeding Experiments with Cows and Calves. (84-97 pp.) [F. 68-1.] Bull. No. 215 :—Cottonseed Meal Feeding Experiments with Mules and Horses. (148-169 pp.) [F. 64-3.] Bull. No. 216 :—Feeding Cottonseed Meal to Draft Animals. (174-186 pp.) [F. 64-3.] Bull. No. 218 :—Feeding Experiments with Beef Cattle. (24-44 pp.) [F. 68-1.] West Raleigh, North Carolina, 1911.

Dairying and Food, General—

Michigan Agricultural Experiment Station.—Bull. No. 264 :—Second Report of Grade Dairy Herd. (75-89 pp.) East Lansing, Michigan, 1911. [G. 50-1.]

Wisconsin Agricultural Experiment Station.—Bull. No. 210 :—Progress of the Dairy Industry in Wisconsin. (30 pp.) [G. 22.] Bull. No. 211 :—Buttermilk Cheesemaking at the Creamery. (17 pp.) [G. 66-1.] Circ. of Information No. 27 :—How to Use the Babcock Test. (26 pp.) [G. 56-5.] Madison, Wisconsin, 1911.

Virginia Agricultural Experiment Station.—Bull. No. 190 :—Co-operative Herd Testing. (30 pp.) Blacksburg, Virginia, 1911. [G. 56-7.]

North Carolina Agricultural Experiment Station.—Bull. No. 220 :—Care and Management of the Dairy Herd. (70-84 pp.) West Raleigh, North Carolina, 1911. [G. 50-1.]

Georgia Experiment Station.—Bull. No. 86 :—Sorghum vs. Corn Meal as a Source of Carbohydrates for Dairy Cattle. (17-27 pp.) Experiment, Georgia, 1909. [G. 50-1.]

Commonwealth of Pennsylvania, Dept. of Agriculture.—Bull. No. 200 :—Skim-Milk Cheese. (15 pp.) Harrisburg, Pennsylvania, 1911. [G. 66-1.]

Memoirs of the Dept. of Agriculture in India, Chemical Series.—Vol. II., No. 1 :—The Composition of the Milk of some Breeds of Indian Cows and Buffaloes and its Variations. Part I.—The Milk of some Breeds of Indian Cows. (61 pp.) Calcutta, 1911. [G. 16; G. 56-7.]

Veterinary Science—

Smith, F.—A Manual of Veterinary Hygiene. [Third edition.] (1035 pp.) London : Baillière, Tindall & Cox, 1905. 15s. net. [H. 28-1.]

United Provinces of Agra and Oudh, Dept. of Land Records and Agriculture.—Bull. No. 24, Agricultural Series :—Note on the Foot and Mouth Disease of Cattle in the United Provinces. (4 pp.) Allahabad, 1911. [H. 36-9.]

Nuttall, G. H. F., and Warburton, C.—Ticks, a Monograph of the Ixodoidea. Part II. (105-348 pp.) Cambridge : University Press, 1911. 12s. net. [H. 50-7.]

U.S. Dept. of Agriculture, Bureau of Animal Industry.—Bull. No. 130 :—Studies on the Biology of the Texas-Fever Tick. (42 pp.) [H. 36-11.] Washington, 1911.

Royal Commission on Tuberculosis (Human and Bovine).—Final Report. Part I. :—Report. [Cd. 5761.] (54 pp.) London : Wyman & Sons, 1911. 6d. [H. 54-3.]

U.S. Dept. of Agriculture.—Farmers' Bull. No. 459 :—House Flies. (16 pp.) Washington, 1911. [H. 50-1.]

U.S. Dept. of Agriculture, Bureau of Biological Survey.—Circ. No. 82 :—The Mammals of Bitterroot Valley, Montana, in their Relation to Spotted Fever. (24 pp.) Washington, 1911. [H. 50-7; K. 2.]

Virginia Agricultural Experiment Station.—Bull. No. 189 :—Some Diseases of Swine. (19 pp.) Blacksburg, Virginia, 1910. [H. 40-1.]

North Carolina Agricultural Experiment Station.—Press Bull. No. 23 :—How to Suppress Houseflies. (2 pp.) West Raleigh, North Carolina, 1911. [H. 50-1.]

Birds, Poultry and Bees—

- North Carolina Agricultural Experiment Station.*—Bull. No. 211 :—Feeding and Management of Poultry for Egg Production. (39-64 pp.) West Raleigh, North Carolina, 1910. [K. 12-3.]
- Storrs Agricultural Experiment Station.*—Bull. No. 67 :—Water Glass a Preservative for Eggs. (267-274 pp.) Storrs, Connecticut, 1911. [K. 12-9.]
- U.S. Dept. of Agriculture, Bureau of Entomology.*—Circ. No. 138 :—The Occurrence of Bee Diseases in the United States. Preliminary Report. (25 pp.) Washington, 1911. [K. 16-9.]
- Ontario Dept. of Agriculture, Ontario Agricultural College.*—Bull. No. 189 :—Farm Poultry, with the Results of some Experiments in Poultry Houses and Fattening Chickens. (64 pp.) Toronto, 1911. [K. 12-3; K. 12-13.]
- U.S. Dept. of Agriculture, Bureau of Animal Industry.*—Circ. No. 172 :—The Ostrich Industry of the United States. (231-238 pp.) Washington, 1911. [K. 8-3.]
- Lander, E.*—Handbuch der Bienenkunde in Einzeldarstellungen. II. Krankheiten und Schädlinge der erwachsenen Bienen. (40 pp. and plates.) Stuttgart: Eugen Ulmer, 1911. [K. 16-9.]
- South Australia, Dept. of Agriculture.*—The Single Testing System of Breeding for Egg Production. (14 pp.) Adelaide, 1911. [K. 12-9.]
- U.S. Dept. of Agriculture.*—Farmers' Bull. No. 456 :—Our Grosbeaks and their Value to Agriculture. (14 pp.) [K. 8-11.] Farmers' Bull. No. 470 :—Game Laws for 1911. (52 pp.) [K. 18-13.] Washington, 1911.
- U.S. Dept. of Agriculture, Bureau of Biological Survey.*—Circ. No. 80 :—Progress of Game Protection in 1910. (36 pp.) Washington, 1911. [K. 18-13.]
- Davenport, Charles B.*—Inheritance of Characteristics in Domestic Fowl. (100 pp. + 12 plates.) Washington: Carnegie Institution, 1909. [K. 12-1; B. 17.]
- Maine Agricultural Experiment Station.*—Bull. No. 176 :—Ligaments of the Oviduct of the Domestic Fowl. (20 pp. + 4 plates.) [K. 12-3.] Poultry Notes—1909. (65-124 pp.) [K. 12-3; B. 17.] Bull. No. 184 :—Digestion Experiments with Poultry. (317-336 pp.) [K. 12-3.] Orono, Maine, 1911.
- Dept. of Agriculture and Technical Instruction for Ireland.*—Conference on the Poultry Industry, Dublin, May, 1911. Report of Proceedings. (234 pp.) London: Wyman and Sons, 1911. 1s. [K. 12-5.]
- Porto Rico Agricultural Experiment Station.*—Circ. No. 13 :—Bee Keeping in Porto Rico. (32 pp.) San Juan, P.R., 1911. [K. 16-5.]
- Michigan Agricultural Experiment Station.*—Circ. No. 12 :—Tuberculosis in Fowls. (4 pp.) East Lansing, Mich., 1911. [K. 12-7.]
- Report of the Departmental Committee on Grouse Disease. [Cd. 5871.] (12 pp.) London, Wyman and Sons, 1911. 1½d. [K. 18-3.]
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